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Gold In The Soviet Economy

NOT the least paradoxical aspect of Russian policy is the key part played by gold in the economics of a Communist State. Lenin said that the day would come when gold would serve to coat the walls and floors of public toilets. Despite this contemptuous remark, the fact remains that, in accordance with a policy initiated by Lenin himself and continued under the leadership of Stalin and Khrushchev, the U.S.S.R. uses gold (produced nowadays at a cost far higher than the world price of the metal) to purchase goods whose production within Russia itself would cost even more. The development and manufacture of some new types of machinery is at present extremely expensive in the Soviet Union until the stage of mass production is achieved. Therefore it pays to purchase such items even with costly gold. Naturally, the Russians would prefer to pay with oil, where the price relationship is not so crippling, or with aluminium and other products when sufficient surpluses are available to permit regular sales in large quantities on Western markets. As yet, however, gold remains the easiest means of obtaining foreign currencies.

The Soviet Union has not published any data on the production of gold since the late 1930's, and it stopped the flow of information on gold exports and stocks many years previously. Estimates relating to sales of gold in Western markets can, of course, be made with relative accuracy; on the other hand, the most authoritative estimates of Soviet gold production and holdings are subject to fairly wide margins of error, since they can be arrived at only by expert analysis of historical data, announced percentage increases, and other evidence gleaned from continuous study of Russian publications. Thus Western knowledge of Soviet gold policy is necessarily based on estimates and conjectures which vary widely from time to time and from person to person, though the picture being patiently assembled by British and American experts may well prove to be surprisingly accurate.

The role of gold in the Soviet economy is discussed in the September, 1961, issue of *Optima* by Oscar L. Altman, adviser in the research and statistics department of the International Monetary Fund. Mr. Altman considers that during the 11-year period 1946-1956 Soviet gold exports probably averaged about $75,000,000 a year, but another estimate, by the Bank for International Settlement, places them at rather more than half this amount. It is generally agreed, however, that really heavy gold sales were made in the next three years. These are estimated at $260,000,000 in 1957, $210,000,000 in 1958, and $255,000,000 in 1959. Sales in 1960 were probably about $125,000,000.

The decline in 1960 has given rise to the suggestion that the Soviet Union deliberately discontinued the export of gold in the latter half of the year, particularly after the price of gold began to rise sharply on the London market in October. The assumed aim of such a policy might be twofold: the limited objective of postponing gold sales in order to realise a higher price later on, and the far-

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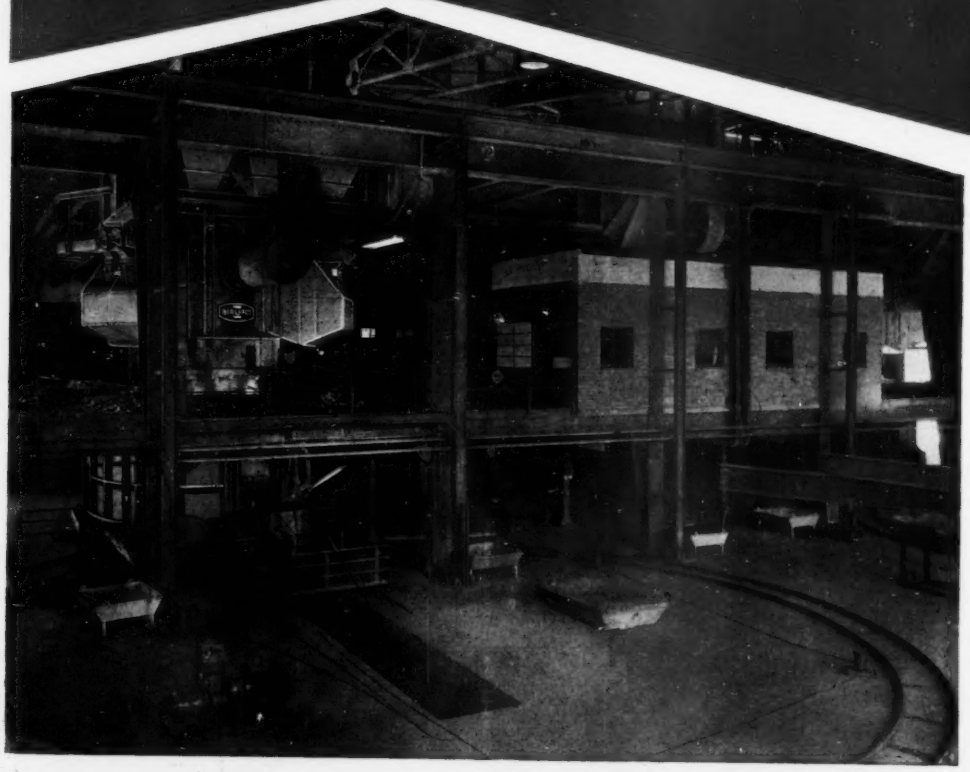

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reaching one of conducting an economic offensive. The latter would involve putting pressure on the financial system of the West by stimulating the speculative fever and perhaps ultimately setting in train forces that might lead to an increase in the official price of gold.

Mr. Altman points out that the 1960 sales were low only in comparison with the high levels of 1957-59. He thinks it probable that they were deliberately reduced during the last half of 1960, though there can be no conclusive evidence about this, but he is of opinion that the amount of postponed sales could not have been very large. On the assumption that the Soviet Union might, apart from speculative considerations, have sold about $250,000,000 of gold in 1960, the amount withheld in the last half of the year might have been no more than one half of this. The effect of private speculation in gold would have had a much greater effect upon the London gold market than any Soviet action. Responsibility for the dislocation of gold must be attributed much more to non-Communist than to Communist activities.

It is, of course, quite evident that the Soviet Union has an important stake in the price of gold. According to figures given in the article, estimates of Russian gold production range from $300,000,000 to $750,000,000 a year and of Soviet gold reserves from $4,000,000,000 to $9,000,000,000. A higher gold price would reduce the quantity of gold reserves considered necessary to meet balance of payments deficits, as well as the quantity of gold required for domestic monetary purposes. If the price of gold were raised at this time, the Soviet Union could not only release gold from its reserves but it could also appreciate the rouble. This would give it an inestimable propaganda advantage. However, while a higher price of gold would undoubtedly benefit the Russians it would at the same time be of greater benefit to the West by increasing international liquidity. This is where the real shortage lies. Given the finance, the West has the productive resources to provide the capital goods needed to support a greatly expanded level of foreign aid, whereas the Soviet industry must be fully committed.

Gold's continued importance to the Soviet economy, in Mr. Altman's view, reflects three elements. First, the Soviet Union produces and stocks gold both to meet fluctuations in its balance of payments and to serve as a "war chest". As the article points out, the Soviet Union cannot be sure of obtaining governmental or private credits on a significant scale whenever it may want them. Its decision not to accept membership of the International Monetary Fund cut it off from an important source of short-term credit. The Soviet Union needs to maintain a high credit standing in current transactions. Experience has indicated the limitations as well as the political repercussions of acquiring foreign exchange by forced exporting of commercial commodities, such as aluminium. For all these reasons, the Soviet decision to maintain substantial gold reserves is fully understandable

Secondly, the Soviet Union has produced gold as a political by-product. In the 1930's, and again during World War II, hundreds of thousands of persons had to be punished or removed from European Russia or Russian satellites They could be put to work at jobs that required only the simplest techniques and tools. Gold mining in Siberia met these conditions admirably. It produced a valuable commodity and had the additional advantage of facilitating the settlement of remote areas.

Thirdly, the Soviet Union attaches great doctrinal importance to gold for monetary purposes, in which context the article quotes Marx's statement that "only in so far as paper money represents gold, which like all other commodities has value, is it a symbol of value". Lenin considered that gold was "necessary in the capitalist present, even if it would become useless in the socialist future".

The cost of producing gold, as compared with Free World costs, is extremely high. A recent estimate put it at U.S. $166 an ounce at the official rate of exchange of the rouble (Jan Kowalewski, *The Times*, June 22, 1959). Mr. Altman points out that the monetary reforms of 1960—the introduction of the "heavy" rouble, followed by the change in the gold content of this rouble—amounted to a devaluation of 56 per cent against the dollar (see *The Mining Journal*, November 25, p. 592). The estimate of $166 an ounce is, no more than $75 at the present official exchange rate.

The opinion is expressed, however, that even this figure is really meaningless, on the grounds that the cost of gold production is irrelevant for pricing policy outside the Soviet Union, while within Russia itself direct cost calculations in roubles are not good guides to production and export-import policies. Such calculations, states the article, reflect all the particularities of Soviet pricing policy, including the large spread (as measured by Western prices) between the prices of producer goods and those of consumer goods.

On the evidence of recent Soviet statements, however, it seems possible that Mr. Altman may have tended to underestimate the importance attached by the Soviet leaders to money-commodity and price-cost relationships. The Soviet Minister of Finance, for example, has described the rouble reform as an effort to "equalise Soviet domestic wholesale prices with those of the world market". The draft of the new Party programme states: "There will be a further strengthening of the monetary and credit system, a consolidation of the Soviet currency, a steady rise of the rate of exchange of the rouble, in virtue of its growing purchasing power, and an increase in the importance of the rouble in the international arena."

The advantages of a convertible rouble are discussed in Mr. Altman's article at some length and there can be little doubt that they are fully appreciated by the Soviet leaders. As the article recalls, the Soviet Union has for a long time declared its aim to make the rouble a key international currency, and even, as a measure of Socialist competition, a currency stronger than the dollar. This aim is associated with the prospect of making the rouble convertible. In these statements, the gold "connection" of the rouble is always emphasised.

In view of its gold reserves, its rate of gold production, and its ability, through state control of foreign trade to control its balance of payments deficits (concludes the article), the Soviet Union could easily make the rouble technically convertible into other currencies. Apart from questions of prestige and propaganda, this would offer the possibilities of acquiring extensive lines of credit at low cost and of significant Soviet interventions in Western markets.

TIN CONSUMERS SHORTSIGHTED, SAY MALAYAN PRODUCERS

The producer-country members of the International Tin Council have registered their acute disappointment with the failure of the Council to raise the floor and ceiling prices for tin at the meeting which ended on October 10. In particular, Malayan miners are unanimous in condemning what they describe as the most unco-operative and uncompromising attitude of the consumer countries. The F.M.S. Chamber of Mines, through its chairman, Mr. K. J. Cumming, has stated that it considers the consumers' attitude "extremely shortsighted and difficult to understand".

Mr. Cumming, in a statement to the Press following a meeting of the Chamber on October 26, said that the proposed new price range of £800-£1,000 a ton was a reasonable one and was fully justified. He disclosed that when the producers submitted their proposal to the International Tin Council in July, the consumers would not consider it because

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they said that they had not sufficient cost-production data available to give the matter fair consideration.

When the Council met again on October 9, the information required had been in the hands of members in ample time for consideration, but apparently the consumers ignored it, and, whilst agreeing that the present floor and ceiling prices were not appropriate for attainment of the objectives of the Agreement, the majority voted against the producers as they considered the time inappropriate to modify the price range.

Mr. Cumming made the point that production can only be stimulated to close the gap between demand and supply if miners are encouraged by an economic and stable price level to expand their operations into deposits of lower grade and to develop new mines in marginal areas.

Deferment by the I.T.C. consumer members of the establishment of a price range which will provide the incentive to the miners, by the assurance of long-term stability of a reasonable level, results in uncertainties and lack of confidence. The consumers' attitude, say the Malayan miners, must directly react against their own interests.

Malayan producers are now called upon to work ground of ever-decreasing grade. In normal circumstances working low grade deposits can only be done economically by working on a very large scale. This in turn must call for large capital investment on high capacity deep digging dredges. However, without the promise of a stable tin price this type of investment will not be forthcoming and future production will tend more and more to be with small units. The low capital investment is the appeal of these small units but in the long term they are certainly not the best units for operating lower grade deposits. This trend is neither to the benefit of the country or the industry itself. In this respect it is significant that whilst the number of active dredges at end of September, 1961, is the same as at end-December, 1960, the number of active gravel pumps has increased from 470 to 558. Units working by other methods at end-1960 totalled 52, making the aggregate active units at that time 591.

TRANSPORTING MINERALS BY PIPELINE

Transporting minerals by pipeline, already largely traditional in mineral treatment plants and reduction-to-treatment movement has never been used to any extent over long distances; in fact, existing installations can be counted on one hand. There is the 72-mile pipeline haul of American Gilsonite Co., and the Pittsburgh Consolidation Coal Co.'s 108-mile flow of crushed coal piped in Ohio, plus similar projects carried out by Anaconda in Chile and in Montana. Apart from these, few significant developments have been recorded in the transportation of solids by pipelines during recent years.

Now, however, there are signs of increasing interest in this method as Mr. R. Costantini, chemical engineer of the Parsons-Jurden Corporation of New York, amply demonstrates in his paper on the subject published in the annual *Mining Transactions*, Vol 220, 1961.

At El Salvador it is planned to extend the existing 14-mile pipeline by an additional 60 miles. Copper concentrates will then be piped to the coast at a rate of 2,000 tons per day. Pulp density is planned at 40-60 per cent solid content, and movement will be performed entirely by gravity. At another (unnamed) copper development in South America, plans are afoot to carry 1,000 tons per day of concentrates 35 miles by gravity pipeline. On the same project, a seven-mile pipe is envisaged to transport 10,000 tons per day of ground ore to the flotation plant.

"For this purpose," says Mr. Constantini, "the ore would be prepared for such transportation at the higher elevation of the orebody. The pipeline would receive the slurry at a relatively high pulp density, thus requiring a minimum of water at the high elevation, and deliver it to the flotation plant some 2,000 ft. lower." Thus is the realisation mooted that in certain circumstances natural topography can be made to aid in the economic operation of a pipeline.

Indeed, in all the cases mentioned, the costs of erecting, operating and maintaining pipelines are stated to be "a small fraction" of those demanded by other transportation.

It is considered that probably some of the most important future developments relating to long distance solids pipelines will be concerned with coal transportation. Pittsburgh Consolidation, previously mentioned as a pioneer in the field, is reported to be planning a 350-mile pipeline from the coalfields of West Virginia to the New York metropolitan area. A coal pipeline, 38 miles long, operates in Russia.

One striking characteristic of the pipeline concept, however, is the great tonnage capacity of a pipe in relation to its circumference. This disproportionate "appetite" demands that a large amount of material be available for transportation before any pipeline can be considered as economic sense. This is a prime point, because in all initial planning, including for example, consideration of pipe size, pumping power and the like, it is revealed that the most important single aspect is the establishment of a "minimum operating average flow velocity in the line to ensure a stable flow condition". The rate of disposal of the material to be transported can thus be anticipated, and the formation of sedimented deposits in the bottom of the pipe itself avoided.

Minimum pumping velocity, the important influence of the size of solid particles in the slurry, specific gravities and the variations of particle sizes, all play a role in the technical aspects of solids piping. The type of pump employed as the prime factor of movement is itself of great importance, but all these considerations are no more than logical. They are seen to exist; it would seem they can be solved.

Indeed, the major problem is to understand the general disinterest of the past, for the mineral dresser must in the main reduce and absorb into pulps the large proportion of his working materials. Movement by pipeline, expanded beyond a purely local conception, would seem the natural sequence of a task that must be performed in any event.

ECONOMIC DEVELOPMENT IN THE FEDERATION

Throughout the past year the political issues concerning both the Federation and its constituent territories have tended to obscure the economic development that continues to be made. There is no doubt that as a result of political fears there has been a sharp decline in the inflow of new capital and the government has been forced to introduce exchange control over residents' holdings but economic stagnation does not exist.

In fact, the reverse is true. As emphasized in Mr. Oppenheimer's review, the Federal economy has continued to expand and the level of industrial activity in all manufacturing groups was 9.8 per cent higher in 1960 than in 1959. Many like to discount the further investment of the mining groups in the Federation on the basis that these are Rhodesian funds being re-invested. This may, in part, be true but new investment continues in many other spheres. The Rhodesian Iron and Steel Company will shortly complete its £10,000,000 expansion programme whilst in the near future there is the major possibility of a £13,000,000 oil refinery project and a £7,000,000 plant for the production of fertilizers.

There is no control on the movements of foreign owned capital and with the foreign exchange reserves now standing at £49,000,000, double their low level, it seems not improbable that the controls on residents will be lifted soon.

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Winning Lignite by Bucket Wheel Excavator

The following article is abridged from " Demag News " and describes a new conception for opening up new lignite deposits in West Germany. The author, Dipl. Ing. Karl Gartner, discusses the latest type of large-scale plant now utilized for stripping overburden and winning coal.

THE bucket wheel excavator delivered to the Braunkohlen und Brikettwerke Roddergrube A.G. has a theoretical daily capacity of 60,000 m³ of overburden, virgin soil or lignite, it being possible to increase this by up to 50 per cent. The capacity illustrates the possibilities opened up by continuously-operating plant in the form of a bucket wheel excavator of this order of size for handling materials in opencast pits or even only for picking up and moving bulk goods generally. The winning of lignite in Western Germany is unthinkable without using plant of this size because of the unfavourable ratio of overburden to coal.

The excavator plant is employed for stripping overburden and winning coal and has to remove thin layers of intermediate materials, too, without showing any considerable loss of output. Large-sized coal is processed by a crusher which can be interposed in the flow of materials. The material is loaded into railway trucks on two tracks. So as to achieve as great a height of working face as possible when using the block method of working, the maximum height of working above the horizontal is 28.00 metres and the working depth below the horizontal 5.00 metres. Apart from that, the loading unit can be operated on a plane which may be up to 14.00 metres higher or 16.00 metres lower than that in which the excavator is working.

Mode of Operation of the Excavator Plant

The whole plant comprises the actual excavator, a connecting conveyor bridge and the loading unit. Excavator and loading unit are independently mobile and mounted on crawler tracks which can be steered. Any variations in distance occurring between the two units during travelling are compensated by the extendable connecting bridge. The excavator is operated and controlled from a main operator's cab at the side of the bucket wheel. There are two of these cabs, one to the right and the other to the left of the bucket wheel; either of them may be used. Railway truck loading operations are controlled from a special cab in the loading unit.

Using the block method of working and making use of the slewing ability of the plant, the material is removed in slices of the greatest possible height and depth. The quantity of material won is dependent on the depth of cut chosen, the slewing speed during excavating and the cutting speed. The speeds of the motions can be regulated. They are coordinated by the excavator operator in such a manner that maximum output is achieved with a minimum expenditure of power.

The plant and all its machinery are designed to withstand the rough conditions encountered in opencast working. Despite this, the plant's load-carrying components are of lightweight construction and are made of material whose stress-bearing characteristics are utilized to the full. This latter feature is of particular importance in keeping the deadweight of this giant within reasonable limits, as the load on the ground, i.e. the specific pressure between crawler tracks and ground, is a prime factor affecting the operation of the plant.

The essential structural components of the excavator are the crawler track unit, the chassis and the superstructure including supporting framework, bucket wheel jib, ballast jib and two supporting masts.

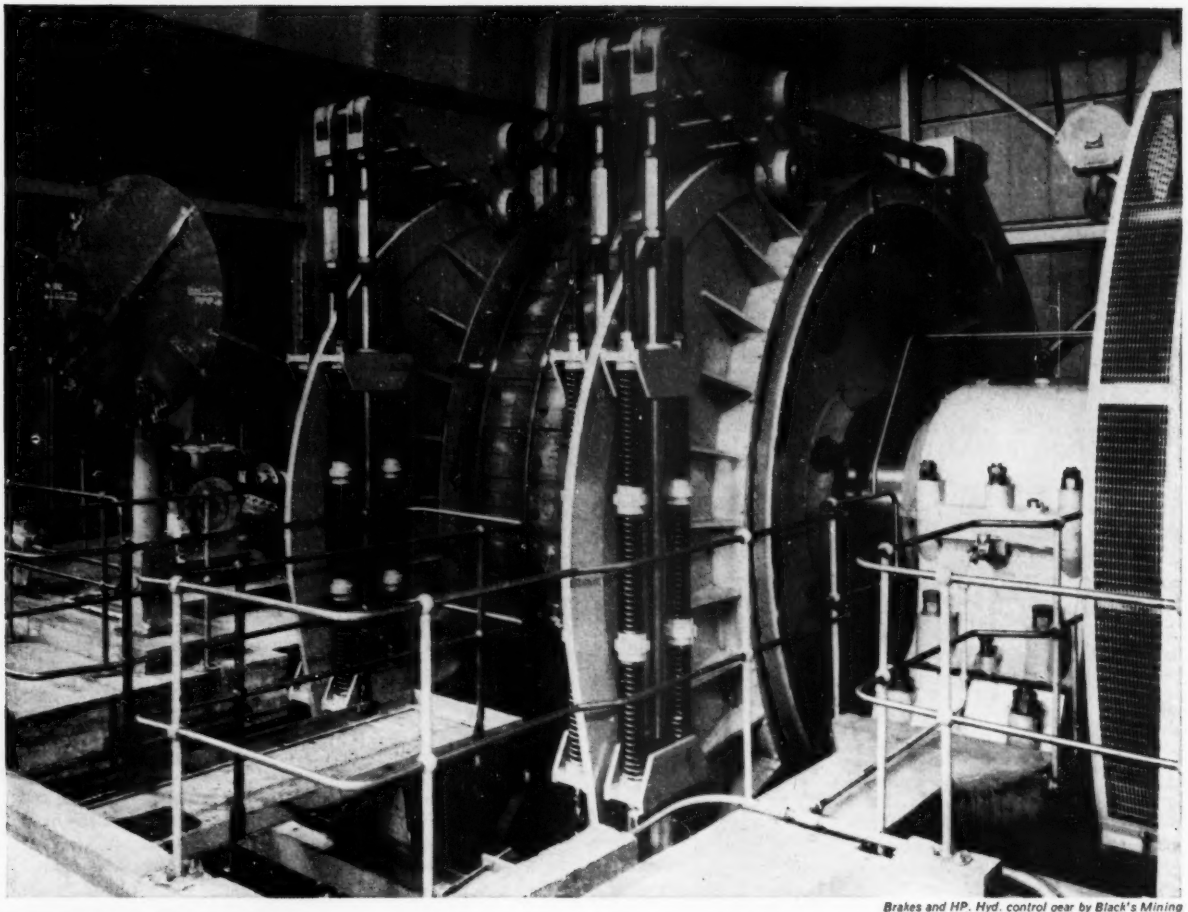
The crawler track unit carries the whole load at three points. The track unit consists of three groups, each with four tracks which are 2.70 metres wide and 10.00 metres long. Each track is individually-driven by a 37-kW motor via planetary gearing. Two groups have a ball-joint connection to the chassis and can be steered by steering and control linkages, enabling curves with a radius as small as 50.00 metres to be negotiated. The third group cannot be steered and is carried on a horizontal axle on the chassis. The crawler track drives — in fact the whole plant — is so designed that the plant can negotiate slopes of up to 1 in 15 with simultaneous cross-fall of 1 in 40.

The chassis, which is a torsionally-rigid welded box construction, accommodates gear for slewing the superstructure, rotary converters, Ward-Leonard sets, slipring junctions, cable reel, housings for electrical switchgear, resistors, transformers, workshops and crew rooms. A ball track for mounting the slewable superstructure is fitted to the chassis. It has 126 load-bearing balls and 126 spacing balls whose diameters are 160 mm. and 148 mm. respectively. When the ball track is being fitted at the assembly stage the track is slightly raised so as to ensure that the balls run smoothly when under load.

The Bucket Wheel

The bucket-wheel jib, which is pivoted in the supporting structure of the slewable superstructure, can be raised or lowered through a pulley block between the two supporting masts by means of a winch. The winch is designed so that two rope systems operate independently of each other. In case of emergency, operation can be continued by using one rope. Four brakes are provided, each being capable of holding the jib. The winch motors operate on the principle of " rope brake control " and permit hoisting and lowering speeds of 7.5 or 5.0 metres/min. at the jib head. An overload protection device at the fixed end of the 51 mm. diameter rope automatically cuts out the winches if the ropes are over or underloaded, e.g. if the bucket wheel meets an obstruction or is lowered on to the ground.

The bucket wheel has a diameter of 14.00 metres and is mounted in the jib head. It is of non-cellular, disc-type construction and has 12 buckets, each of 1900 litres capacity. It is driven by two 400-kW motors via a triple bevel gear unit clamped to the bucket-wheel axle. Speed of rotation is regulated by Ward-Leonard control and allows up to 66 bucket discharges per minute. In order to change over from working above the horizontal to working below, the buckets are reversed and the sense of rotation of the bucket wheel changed. Cutting force is limited by pneumatically-controlled Ortlinghaus disc clutches fitted as a safety precaution. They prevent a torque exceeding 1.4 times the motor torque being transmitted.



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The belts are from 2.20 to 2.60 metres wide, some are troughed and some flat belts. Their speeds, progressively increasing from bucket wheel to loading conveyors, vary from 3.0 to 3.5 metres/sec. The dirt belts run at 0.5 metres/sec. Steel cord and standard belts of up to 2 x 60.6 metre length are used. Control and guide rollers, outer inclined rollers in the case of the troughed belts, and adjustable tensioners ensure straight, steady running of the belts, independent of loading and type of material being conveyed.

Careful design of chuting and the transfer points and sensible arrangement of baffle plates ensure that the enormous quantities of material flow smoothly through the plant. The counterweight required to balance the weight of the bucket wheel is accommodated in the ballast jib and gives the plant stability. In addition, housings giving a floor space of 130 sq. m. for accommodating switch-gear, rotary converters, resistors and other electrical equipment, are located at two levels at the end of the ballast jib.

The superstructure can be slewed through 360 deg. relative to the chassis. This slewing motion is, however, limited by the connecting bridge being ball-jointed at the slewing point of the superstructure. Relative movement between superstructure and connecting bridge is only possible up to ± 105 deg.

Mining in Tunisia

TUNISIA consumes only a very small proportion of her mineral production. All the zinc ore produced is exported, 98 per cent of the iron ore, 95-98 per cent of the lead metal, 85 per cent of the calcium phosphate, and 85 per cent of the superphosphate and hyperphosphate obtained by processing the remainder of the latter product. The prosperity of the Tunisian mining industry is entirely dependent, therefore, on world markets.

As in other countries, the lead mines have suffered from the low prices ruling in recent years, which are responsible for a decline in both production and exports. Operations have been finally suspended at two mines, Ressas Toureuf and Sidi Amor, which are now exhausted. Other companies await an improvement in the market to resume operations (Khanguet Kef Tout), or to develop production or instal equipment (Djebel Azered, Koudiat Safra).

The lead mines currently in operation have a total production capacity of the order of 30,000 t.p.a. The reopening of dormant mines could raise this to 40,000 t.p.a. It is intended to maintain production this year at not less than the existing level by means of government subsidies. A reduction in the price of electricity, to take effect in 1961, has also been decided upon to assist these mines.

The production of zinc ore was higher last year, as the table shows, and a further slight increase is expected in 1961. The only mine in active operation is El Akouat.

Last year witnessed the start of extraction at the Fedj el Adoum mine, which produces a zinc-lead ore (35 per cent Zn, 25 per cent Pb.) An output of 1,400 tonnes was recorded for 1960 and it is hoped that 2,500 tonnes will be produced in 1961.

Production of iron ore also showed some improvement in 1959, despite the partial suspension of operations by Douaria, due to lack of sales. Of the mines operated by this group only Tamera was in operation and on a greatly reduced scale. With a production capacity approaching 100,000 t.p.a., Tamera produced only 20,000 tonnes last year. At Djerissa, thanks to increased demand, an output of 997, 091 tonnes was achieved. Production is expected to remain at approximately the same level in 1961. With adequate equipment Djebel Ank's production capacity could be raised to 500,000 t.p.a., but the problem of finance has not yet been solved.

As in 1958 and 1959, production of calcium phosphate amounted last year to slightly over 2,000,000 tonnes and a similar level is envisaged for 1961. It is believed that with existing capacities total mine production could reach 2,300,000 tonnes, made up as follows : Gafsa Co. 1,600,000 tonnes, Djebel M'Dilla Co. 400,000 tonnes, and the Kalaa Djerda mine 300,000 tonnes. This year the production of calcined phosphate (75 per cent P_2O_5) will be started by Djebel M'Dilla and it is expected that output will amount to about 100,000 tonnes. Gafsa is aiming to produce 1,000,000 t.p.a. of calcined phosphate of similar grade. This project will be put in hand soon after the conclusion of certain tests currently in progress at Métlaoui.

In September, 1960, Tunisia joined with Algeria, Togo and Senegal in forming a new organisation known as l'Union Phosphatière Africaine, to handle the sale of their products.

The investments foreseen for 1961 are approximately as follows :

Phosphate mines	.. 560,000 dinars*
Iron ore mines	.. 125,000 dinars
Other metal mines	.. 320,000 dinars

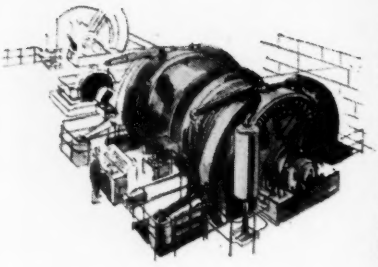
* 1.171/2 dinars = £1 sterling

For 1961, the programme for aiding the development of mining production by means of loans, subsidies or state participation has been fixed at 500,000 dinars by SOREMIT, the national undertaking entrusted with the management of funds made available by the government for this purpose. Of this figure 200,000 dinars are earmarked for state participation in the capital of Sidi Bou Aouane, where production is to be developed.

Production of Metals and Minerals
(in tonnes unless otherwise stated)

	1958	1959	1960
Lead ore	35,546	28,213	27,839
Zinc ore	6,074	5,912	6,706
Zinc-lead ore	—	—	1,403
Iron ore	1,103,174	981,662	1,033,390
Calcium phosphate	2,278,532	2,134,963	2,095,997
Lead metal	26,381	21,808	19,017
Quicksilver (kg.)	1,350	6,837	5,708
Silver	4,205	1,347	1,070
Marine Salt	160,097	150,954	115,000

NORDBERG MINING MACHINERY



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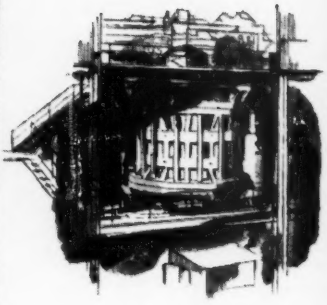

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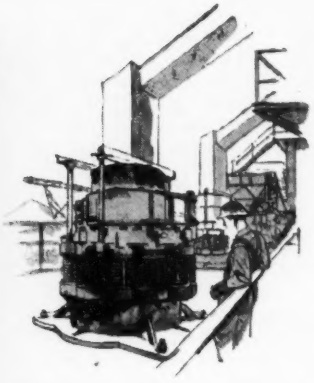

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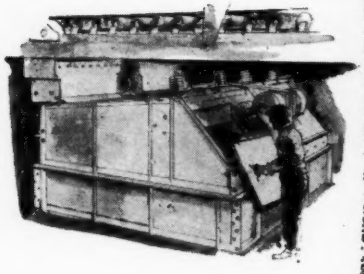

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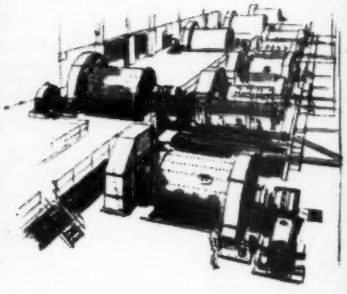

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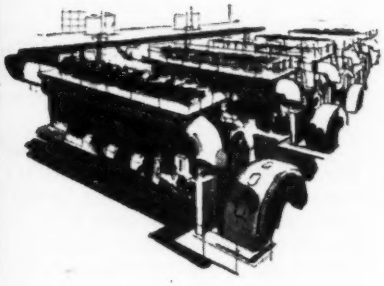

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SULPHUR OXIDISING BACTERIA IN LEACHING OPERATIONS

THE continuing depletion of high-grade ore deposits has created a need to develop more effective methods for recovering valuable metals from low-grade ores. The use of micro-organisms for their biochemical reactions is one possible way to solve this problem. Though bacteria have been used successfully in many industries, little attention has hitherto been focused on their use in mining and metallurgical processes.

Hydrometallurgical leaching operations throughout the western part of the United States rely on either atmospheric oxidation of the sulphide minerals in the ore or on the combined reaction of atmospheric oxidation and commercial sulphuric acid to extract metals from low-grade ores. In some of these operations, natural bacterial activity is assisting in leaching the metals. In recent years scientists have achieved varying degrees of success in applying bacteria isolated from acid soils and acid mine waters to leaching molybdenum, copper, manganese and zinc from low-grade ores.

A report by Joseph A. Sutton and John D. Corrick describes some laboratory experiments with the sulphur-oxidizing bacterium *Thiobicillus thiooxidans.* Entitled "Bacteria in Mining and Metallurgy: Leaching Selected Ore and Minerals; Experiments with *Thiobacillus Thiooxidans,*" it has been published by the Bureau of Mines, U.S. Department of the Interior, as RI 5839. The objective was determine whether this bacterium could use sulphur compounds to produce sulphuric acid for leaching metals from low grade ores. This work constitutes one phase of an investigation undertaken to determine the feasibiliy of employing micro-organisms in mining and metallurgical processes.

Th. thiooxidans, first described in 1921, is one of several non-filamentous bacteria that do not accumulate elemental sulphur within the cell. This bacterium is distinctive in that it not only tolerates but also produces higher concentrations of acid (as much as 10 per cent H_2SO_4) than any other living organism yet reported. It obtains oxygen for metabolic processes, carbon for cell structure, and fuel for energy from atmospheric oxygen, carbon dioxide, elemental sulphur and thiosulphate respectively.

The results of extended tests indicated that the bacterium was capable of extracting appreciable amounts of copper and cobalt from ore and mineral samples when sulphur was available in a state that could readily be assimilated by the organisms. Under the conditions of these tests, this organism was not able to assimilate and oxidise the sulphur as it occurred in the ores and minerals. Ores containing copper minerals in the silicate, carbonate and oxide forms, in the presence of elemental sulphur, were more susceptible to bacterial action than ores containing copper minerals in the sulphide form.

In instances when only negligible quantities of metals were extracted from the ores as a result of bacterial activity, the minerals were either in a form not easily dissolved by sulphuric acid or a bacteriostatic condition was produced by one or more constituents in the ore.

The quantity of copper extracted from copper silicate, carbonate and oxide minerals, as a result of bacterial activity, was greatly increased when the acidity of the nutrient solution was adjusted to a pH of 4.

Acid produced by the bacterium *Th. thiooxidans* was as effective in extracting copper as chemically pure sulphuric acid having the same sulphate content.

RECOVERING FLUORINE FROM OFFGRADE ORES

THE increasing demand of the chemical industries for fluorine has focused attention on development of processes for recovering fluorine from offgrade ores. These defluorination studies constitute the initial phase of a programme intended to develop processes for recovering fluorine from siliceous fluorspars that are presently considered submarginal.

Information published in 1960 indicated that the total U.S. reserve of fluorspar containing more than 35 per cent calcium fluoride is approximately 22,600,000 tons. An additional reserve, estimated to be 12,000,000 tons of low-grade fluorspars containing 15 to 35 per cent calcium fluoride, is not being used. Many of the low-grade ores can be beneficiated to 60 or 70 per cent CaF_2, but because of their intimate association with gangue material, it is either uneconomical or technically unfeasible to upgrade these ores to acid-grade specifications (not less than 97 per cent CaF_2 and not more than 1.1 per cent SiO_2).

Approximately 43 per cent of all fluorspar consumed in the United States is acid grade. Steadily increasing demands for fluorspars meeting acid-grade specifications are rapidly depleting high-grade domestic reserves, and industry's requirements are being met more and more by imports. A total of 494,227 tons of fluorspar was consumed in the United States during 1958, and of this amount, 392,164 tons was imported. During this period, the hydrofluoric acid industry consumed 258,935 tons of fluorspar, of which 205,593 tons was imported.

Previous work of defluorination of western phosphate rock, containing fluorine as fluorapatite, indicated that high temperature calcination of siliceous fluorspar in a water-vapour atmosphere would liberate fluorine. This report describes the development of a laboratory method for thermally defluorinating siliceous fluorspars.

The Federal Bureau of Mines conducted extensive studies on solid-state defluorination (intermediate scale) of siliceous fluorspars. The studies were made to develop a pyrohydrolytic process for liberating fluorine from offgrade fluorspars. Test results showed that more than 90 per cent of the fluorine can be evolved by solid-state defluorination at 1,300 deg. C., and more than 97 per cent can be liberated by molten-state defluorination at 1,420 deg. C.

Solid-state defluorination conditions were established by conducting tests on mixtures of ceramic-grade fluorspars and high-purity silica flour. Pelletized mixtures were defluorinated under varying conditions of time, temperature and relative concentrations of silica, calcium fluoride, and water. The effects of adding various amounts and combinations of aluminium oxide and iron oxide on defluorination were also studied.

Investigations of solid-state defluorination indicates that the following two reactions are involved:

$$2CaF_2+3SiO_2=2CaSiO_3+SiF_4,$$

and

$$CaF_2+SiO_2+H_2O=CaSiO_3+2HF.$$

The second reaction is dominant, although significant defluorination can be achieved by the first reaction.

It may be definitely concluded from the tests that better defluorination is achieved with increasing temperature, and that raw ores can be effectively defluorinated without recourse to blending.

The limited data indicates that molten defluorination should be intensively investigated.

BRAZIL EXPANDS IRON ORE EXPORTS

BRAZILIAN exports of iron ore have increased steadily in the past three years, as shown in the table below, the greater part coming from the Companhia Vale do Rio Doce, the government-controlled mining and exporting enterprise, which last year shipped 78.5 per cent of the country's total iron ore exports via the port of Vitoria, as against 80 per cent in 1959; the corresponding values f.o.b. Brazil of these exports amounted to the equivalent of $U.S.43,817,411 in 1960 compared with $U.S.35,812,077 in 1959.

The company's principal customers last year were: U.S.A. with 1,234,420 tonnes (28.91 per cent of Brazil's total shipments), Western Germany 910,667 tonnes (21.33 per cent), U.K. 677,765 tonnes (15.87 per cent), Japan 383,474 tonnes (8.98 per cent), Czechoslovakia 359,484, Poland 290,964, Canada 152,500, France 107,179. Among recent new customers are Argentina and Australia, the latter with 14,874 tonnes imported last year.

The North American market absorbed 28.91 per cent of the company's iron exports in 1960, or 1.59 per cent less than in 1959, while Europe's share decreased by 2.33 per cent to 58.54 per cent. Japan's proportion of the total exports continues to increase and rose from 6 per cent in 1959 to 8.98 per cent in 1960.

IRON EXPORTS

Year	*Via Rio*	*Via Vitoria*	*Total in tonnes*
1958	696,759	2,247,550	2,944,309
1959	922,835	3,261,453	4,184,288
1960	1,133,705	4,269,613	5,403,318

Agency messages from Tokyo suggest that Brazil will shortly replace India as Japan's principal supplier of iron ore, provided the transport problem can be solved. Incidentally, Japan is reported to be organizing a fleet to carry 60 per cent of her imports of iron ore, and Japanese steelmakers estimate their requirements in 1970 at 48,000,000 tons.

Shipments to Europe

Recent shipments of hematite to Europe include 16,535 l. tons, with 67 per cent Fe to Dusseldorf, 299,087 l. tons to Western Germany, 46,648 l. tons to Holland and smaller quantities to Austria, Czechoslovakia, Poland, Spain and Finland. The Brazilian Bank for Economic Development is negotiating with Yugoslavia, Czechoslovakia, E. Germany and Poland to exchange iron ore for industrial equipment, particularly materials for thermo-electric power stations. Poland, which consumes 10,000,000 tons of iron ore annually, plans to import 400,000 tons from Brazil and is considering raising the figure to 1,000,000 tons. During the first six months of this year 33 ships were engaged in carrying iron ore from Brazil to European ports. Most of them were German and Swedish vessels.

Companhia Vale do Rio Doce has completed its third Link-Belt installation, raising export capacity via the port of Vitoria to 8,000,000 tons. This was designed to expand exports of run-of-mine hematite, which amounted to 99,111 tons last year. The other two installations, completed in 1957 and 1959, handle lump hematite and fines, which comprised 3,441,984 and 684,793 tons of the total exported last year. The new equipment has speeded up the discharging of wagons, loading of steamers and warehousing of stocks awaiting shipment. The carrying system can handle 1,850 tons of variable run-of-mine ore hourly, or 2,700 tons in emergencies. The capacity of the loading towers has been doubled.

Improvements during the past three years to the Vitoria-Minas Railway have helped considerably to raise export capacity. The line is a subsidiary of the Vale do Rio Doce Company and carries ore from the ex-British Itabira mines, in Minas Gerais, to the port of Vitoria, a distance of 342 miles. Recent improvements include strengthening and realignment of the permanent way, the elimination of sharp curves and steep gradients on the 50-mile mountain section, the installation of automatic couplers and air brakes and additions to motive power and rolling stock. Formations of 112 gondola-type wagons, drawn by five diesel-electric locomotives, now haul loads of 8,064 tons of ore from mines to port in 16 hours.

Exports via Rio de Janeiro

The Central Brazil Railway, which links the Paraopeba Valley mines to the port of Rio de Janeiro, has also been improved during the last two years so as to raise Brazil's export capacity by a further 2,000 tons annually. The Linha do Centro, or Mineral Road, the section serving the mines, has been practically re-laid, 250 miles of deviations having been completed between Lafaiete and Barra do Pirai, on the outskirts of Rio. A central traffic control system has been installed while additional rolling stock and motive power have been acquired. As a result, train weights and speeds have been raised and compositions of 90 wagons, hauled by four or six diesel-electric locomotives, transport loads of 7,835 tons of ore from the mines to Arara, the mineral quay at Rio de Janeiro, a distance of 277 miles, in difficult mountainous country, in 22 hours and 30 minutes.

The Central Brazil Railway carried 21.5 per cent of Brazil's exports of iron ore in 1960 and the Engineer-in-Chief predicts that the line will be able to carry 2,400,000 tons by the end of 1961, increasing to 7,000,000 tons in 1965.

Extensive reforms are planned for the ex-British Leopoldina Railway, the Central's competitor between Minas Gerais and Rio de Janeiro, and for Rede Mineira da Viacao, which carries the overflow of iron ore from the Paraopeba Valley to the port of Angra dos Reis, on the coast near Rio. This line is being completely overhauled, electrified and connected to the Central Brazil by a branch from Lima Duarte to Bom Jardim, while the port at Angra dos Reis is being re-equipped and enlarged.

Investigations by a government commission a few years ago showed the possibility of extracting 10,000,000 tons of iron ore annually from the Lafaiete district of Minas Gerais. But to export such a volume will necessitate by-passing the congested approaches to Rio de Janeiro. Several projects to do so are, or have been, under consideration. A concession has been granted to private enterprise to build and exploit an electric train from Andrelandia to Itabirite, the concessionaire to obtain running rights over Rede Mineira de Viacao and licence to use the port of Angra dos Reis.

Another project, approved by the Brazil-United States Mixed Commission, is the construction of a port at Itacurussa, on the Rio de Janeiro coast, and connect it by rail to Japeri, 16 miles distant on the Central Brazil Railway.

The M.A. Hanna Corporation, of Cleveland, who now hold the controlling interest in the Sao Joao del Rei Co., are organizing an enterprise to exploit the iron ore deposits of Aguas Claras, in Minas Gerais with a view to participating in Brazil's export drive. With this object the corporation's representatives are studying the possibility of building a railway to connect the Valley of Rio das Velhas to the Bay of Sepetiba, near Rio de Janeiro, thereby facilitating large-scale exports without adding to the pressure on the Central Brazil Railway and the busy port of Rio de Janeiro. Negotiations are now proceeding with Rede Ferroviaria Federal for the purpose of reviving the project for a port at Itacurussa and connecting it by a branch line to Japeri.

Turkey's Mining Programme 1961-62

THE following items are included in the Turkish Mining Assistance Commision's programme for the year ending June 30, 1962.

Iron—Taking of samples, opening galleries, plans and maps (private enterprise).

Phosphate—The work carried out during prospecting for oil by various companies will be made use of, analysis and study of concentrations will be undertaken.

Tungsten—There is a certain geological similarity between the deposits of tungsten found on Uludag and the deposits held by private enterprise. Studies will be undertaken, together with mapping, drilling, etc.

Fluorine—Practical help will be given for improving access to the mines which are being worked.

Chromite—Search for foreign markets for the sale of chromite. The possibility of manufacturing briquettes of concentrated chrome will be studied. The possibility of home consumption of ferro-chrome to support the projected industry using this alloy will be analysed.

Copper—Existing mining enterprises are to be extended and improved.

Zircon-Titanium—Prospecting for deposits known to exist on the Black Sea coast. Geological studies of terraces and analysis of the possibility of re-concentrating sand brought up on to the beaches.

Manganese—Metallurgical studies of deposits in Thrace. Surveys, map making studies and drillings in the Black Sea.

Lead and Zinc—Analysis of the justification for setting up in Turkey a lead and zinc foundry to supply home consumption and export requirements in the form of concentrates.

Quicksilver—Map survey of deposits. Mines to be improved by lending specialists to existing small mines to make them more economic.

Gold—Survey of workable deposits. Establishment of relations between foreign refiners and native workers of gold veins.

Cobalt—Search for new deposits and exploitation of existing ones.

Magnesium—Mines to be improved and new markets sought.

SCANDIUM IN U.S.S.R.

RUSSIA'S resources of scandium are discussed in a report prepared by V. P. Sokoloff (Commodity Industry Analyst, Division of Foreign Activities, U.S. Bureau of Mines) and published in *Mineral Trade Notes*, Vol. 53, No. 4.

The minimum economic content of scandium in minerals and concentrates in the U.S.S.R. is given below.

Type of Ore	Scandium-bearing minerals	Minimum per cent scandium In minerals	In concentrates
Quartz-wolframite	Wolframite	0.04	0.02
Muscovite-wolframite	Wolframite	0.04	0.02
Quartz-cassiterite	Cassiterite	0.04	0.02
Amphibolite-magnetite-fluorite	Ferrimuscovite	0.10	0.05
Pegmatite	Orthite, viikite, chlopinite	0.10	0.05

Sokoloff points out that the economic production of scandium depends not only on the grade of the scandium ore, but also on technological properties of the ore, the size of the ore reserves, and the presence of other extractable values, such as beryllium, uranium, and columbium. Thus, there are no cutoff grades based on scandium for davidite, beryl, and zircon ores.

Wolframite wastes and cassiterite slags are also economic sources of scandium, if they contain more than 0.04 and 0.1 per cent scandium, respectively. So far, no cutoff grades have been set for coal ash or for beryllium wastes.

According to certain allusions in *Razvedka Nedr. No.* 10, 1956, in an article on "Appraisals of Reserves of Dispersed Chemical Elements", by A. D. Kalenov, a survey for scandium may have been carried out in the U.S.S.R. An important detail quoted from the report stated that owing to serious errors in the sampling of scandium in the oxidized zone, some high-grade sources were overlooked. Scandium is leached easily and rapidly from wolframite and pegmatite.

Deposits and Reserves

Scandium provinces are in Central Kazakhstan, Karelia, Ukraine, Transbaykalia, Primor'ye, and N. E. Siberia.

The only available data on the scandium content of wolframite ores in the U.S.S.R. are given in an article in *Geokhimiya*, 1958, No. 6, pp. 582-586, entitled "On the Subject of Distribution of Scandium and Columbium (Niobium) in Wolframites", by L. F. Borisenko and N. V. Lizunov. Only 11 deposits of scandium-bearing wolframites out of 48 hydrothermal-pneumatolytic deposits tested had enough scandium to classify them as scandium ores. Ores from these deposits had Sc_2O_3 contents ranging from 150 to 800 grams per ton, both additional values in columbium (0.08 to 0.26 per cent Cb_2O_5) and tungsten.

It is believed that the Soviet reserves of commercially extractable scandium may be a few hundred tons, not counting the submarginal placers or the occasionally scandium-high sedimentary phosphates, slags, tailings dumps, and so forth. The ashes of some weakly metamorphosed coals and some brown coals used by thermoelectric power stations contain about 200 grams of scandium per ton. Should there be an incentive to produce large quantities of scandium, the coal ash could easily become the principal source of that metal, in the U.S.S.R. and elsewhere.

Wherever gold and silver ores are treated, from the tropics to the frozen North, drums of 'Cassel' brand sodium cyanide are a familiar sight. Among I.C.I.'s most remote regular customers are gold mines in Australia. Here's the story of a recent consignment to the famous Great Boulder Gold Mines of Kalgoorlie, users of 'Cassel' cyanide for the past 60 years.

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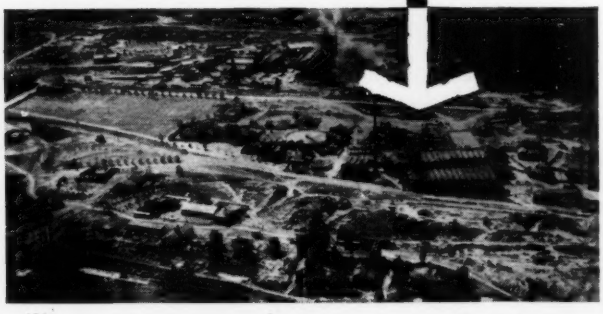

Cyanide is only one of the chemicals I.C.I. offers for ore-treatment processes, and the skill and experience of I.C.I.'s comprehensive Ore Treatment Service goes with them all.

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Locating Conductive Minerals

Two new ground A.F.M.A.G. designs have been announced by McPhar Manufacturing Ltd., Canada. A.F.M.A.G., a recently-developed method of locating conductive mineral deposits, uses the earth's natural electrical fields as a source of energy. For this reason no transmitting equipment is needed and the detection range is claimed as greater than that of the electromagnetic method commonly used for the same purpose.

Field evaluation studies carried out in two widely separated climatic regions have confirmed the theoretical advantages for this new prospecting method, the manufacturer states. In one region, close to the Arctic Circle, four special high sensitivity ground units were usel to locate anomalies indicated by a helicopter A.F.M.A.G. survey. At another location, close to the Equator, a special tropicalised unit of the same design is being used in the area where tropic weathering extends to a depth of 200-300 ft.

A new low frequency unit has been developed to operate below the frequencies used in the transmission of electric power. It is claimed this innovation extends the effectiveness of A.F.M.A.G. in areas influenced by the electrical fields created by the harmonics of the power transmission lines.

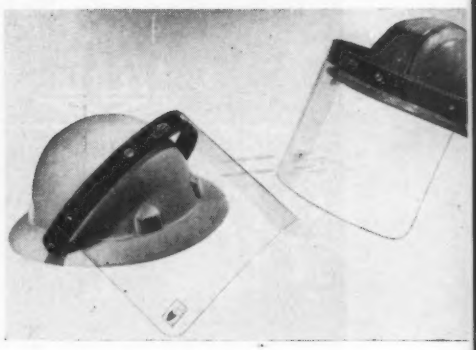
SPEEDING SULPHUR CARGO HANDLING

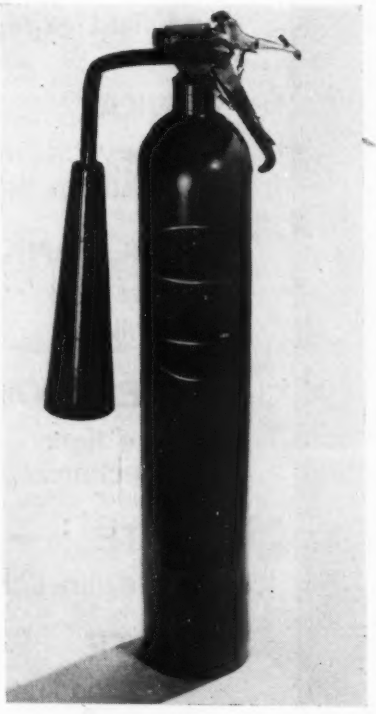
Handling bulky cargoes of sulphur and other chemicals has always been a costly and time-wasting operation. In the U.S. loading and unloading operations have been greatly speeded up by the introduction of specially designed pumps capable of handling sulphur in its molten state heated to a temperature of 275 deg. F. The liquid chemical is pumped directly from heated shore tanks into the cargo vessel in a fraction of the time normally required to handle a solid shipment.

First ocean-going tanker devoted exclusively to the transportation of molten sulphur, the S.S. *Marine Sulphur Queen*, went into service earlier this year and is now delivering cargoes from the Texas Sulphur Co. plant in Beaumont, Texas, to molten sulphur terminals at Tampa in Florida, Norfolk in Virginia and Carteret in New Jersey. Owned by Marine Transport Lines, Inc., of New York, the 523 ft. tanker can carry 15,100 tons of molten sulphur in special steam-heated tanks. Before being converted she was the oil tanker *Esso New Haven*.

Eight vertical turbine pumps, specially designed by engineers of Fairbanks, Morse and Co., largest industrial subsidiary of Fairbanks Whitney Corporation of New York, lift the hot cargo up out of four shipboard tanks and transfer the liquid to storage facilities on shore. Each of the 10 in. four-stage Fairbanks Morse pumps being used has a rating of 650 g.p.m. against a 140 ft. total dynamic head. The bowl assembly, disconnect box, discharge column and discharge head are completely steam-jacketed to maintain the sulphur at its proper temperature. In other respects construction of the pumps is standard cast iron, carbon steel, with stainless steel bolting. The bearings are soft cast iron, lubricated by the liquid sulphur.

This method of shipping sulphur cargoes is reported to have proved highly successful and could well be applied to other chemicals.





AIR LEG DRILL

A new air feed leg drill, the FL63, has been introduced by Gardner-Denver Co. It is designed to be used as a stoper, drifter or sinker.

Especially suited to work in small headings and stopes difficult of access, the FL63 is said to drill more footage because of perfect hammer blow and feed pressure balance. Maximum drilling speed and correct bit pressure are maintained regardless of ground changes.

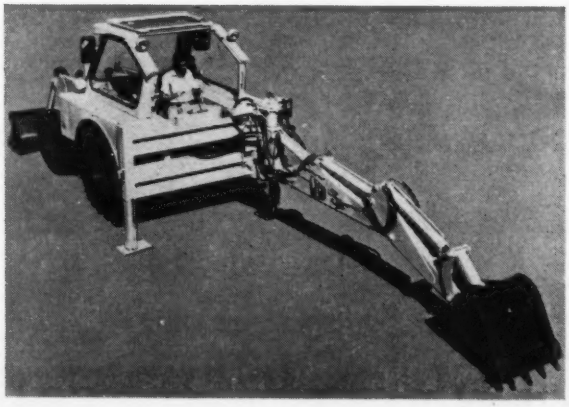
Special features of the new Gardner-Denver FL63 drill include: aluminium alloy cylinder, piston rod wiper, centralised controls and a single air source for both drill and Feed Leg.

The FL63 can be equipped with retractable, non-retractable or telescopic feed legs. This new drill is said to have been designed for maximum operator convenience and versatility.

NEW MAGNETIC SEPARATOR

Rapid Magnetic Ltd. introduce their WY/WZ range of electro magnetic chute separators, for extracting fine iron present in free-flowing processed material.

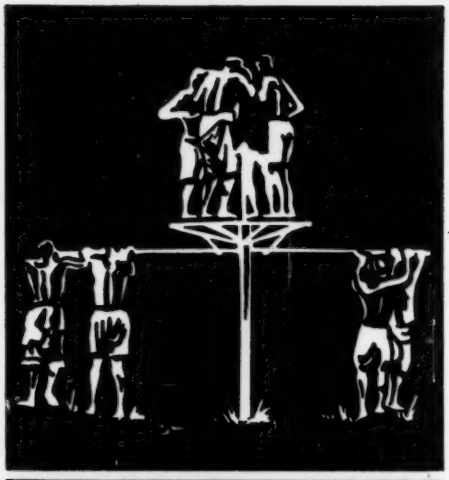
Typical installations include WY units

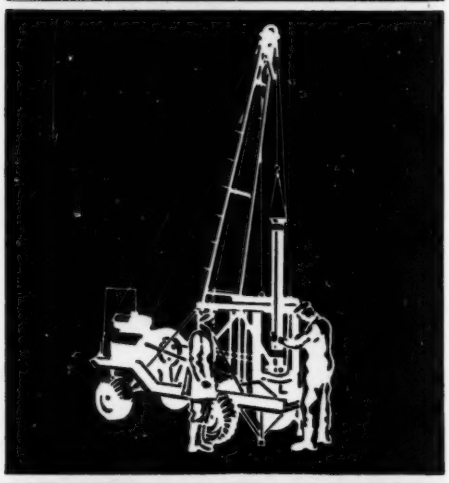


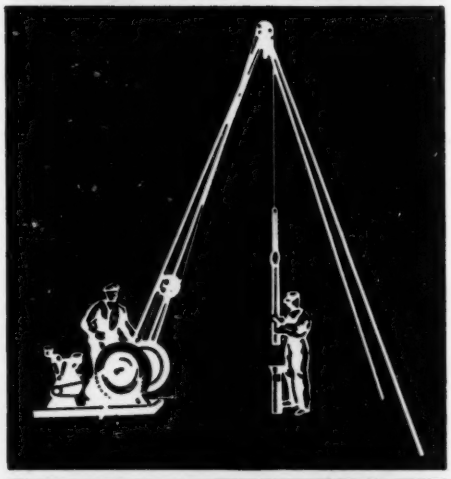
Top right: **the latest addition to the Safety Products Ltd. range of personal safety equipment is a combination of hard hat and face shield. Basically there are two models of the equipment.** *Right* **is the VA/1, a peak style hard hat available in plastic or fibre-glass,** *left* **is the VA/2, a full-brimmed type hard hat available in plastic only**

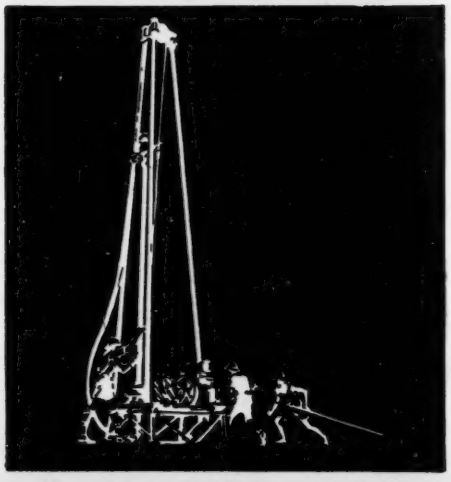
Centre: **the Foamite CO_2-filled fire extinguisher now has a director horn moulded from Rockite dough moulding compound. The horn for the Foamite 2½ lb. and 5 lb. capacity CO_2 extinguisher is moulded by Xenit Products Ltd. from Rockite D.M.C. manufactured and marketed by British Resin Products Ltd.**

Left: **a new hydraulic excavator known as the J.C.B.3 has been introduced by J. C. Bamford (Excavators) Ltd. Salient features of the new machine include tear-out force of 11,600 lb., an optimum cycle time of under 10 sec., 23 in. ground clearance. The J.B.C.3 is powered by a Fordson Super Major diesel developing 57 b.h.p. at 1,800 r.p.m.**









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DRILLING EQUIPMENT

for the investigation of Alluvial Ore Deposits and Bauxite.

Half a century of technical and field experience.

BANKA
the world renowned portable platform drill.

MECA BANKA
the fully mechanized Banka drill.

POWER PIONEER
the light weight semi-mechanized all purpose drill.

SOLITE
the ultra light weight rotary drill.

MIDLITE
the medium weight rotary drill.

DD-00
the small "spudder" for depths up to 500 feet.

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The Rapid Magnetic WY/WZ electro magnetic chute. The totally enclosed type.

for removing iron scale from granulated sugar. An 18 in. wide unit with two poles is capable of treating approximately 20 t.p.h.

The stronger WZ range will handle double this throughput. Tapered pole units are incorporated and a magnetically held bridge ensures that in the event of a power failure, the untreated material is diverted from the main flow.

TRACING FLOW OF UNDERGROUND LIQUIDS

A promising new method for tracing the flow of water, oil, and gas underground has been invented within the U.S. Bureau of Mines. First uses of the new method are foreseen in predicting the effectiveness of water floods, in obtaining additional recovery in oil and gas fields, and in following the underground movement of sources of fresh water.

In applying the new process to water flooding, a harmless tracer substance dissolved in water is pumped underground through an injection well. Then, after the water has carried the tracer through a formation to a producing well, a sample is taken. The tracer is then made radioactive and its radioactivity is measured with a detector. This measurement tells how much of the tracer has reached the producing well, thus furnishing valuable information on water flooding. A similar sequence could be followed in tracing movement of underground water.

Most important feature of the invention is that radioactivity is not created until after the tracer material has passed through the formation being studied and reaches the check point. Another advantage is that the method uses tracer substances that are not easily filtered out or adsorbed by sand or porous rock of the underground formations through which they must pass. Water-soluble salts of several elements that can be made highly but briefly radioactive with short bombardment by neutrons are suitable for the new process.

Applications for using U.S. Patent No. 3,002,091, *Method of Tracing the Flow of Liquids by Use of Post Radioactivation of Tracer Substances* can be made by writing to the Office of the Solicitor, Department of the Interior, Washington 25, D.C., United States.

MINING MISCELLANY

Prospecting in Brazil.—The new Ministry of Mines and Energy is investing 127,000,000 cruzeiros this year in prospecting mineral deposits in Goias, a state which has hitherto received inadequate attention although it is already known to contain valuable occurrences of nickel and less known deposits of mica, chromite, rock crystals, cassiterite, manganese, iron, amianthus and cobalt, as well as gold and diamonds.

New Canadian Coal Mine.—Great West Coal Co. of Saskatchewan, are to mark the anniversary of 50 years of coal mining in Canada by opening a new mine at Estevan, with modern facilities. Great West Coal has constructed a new metal tipple, served by nine sets of tracks, with a production of 650 tons per hours of screened and loaded coal.

Handy & Harman's new plant.—Handy and Harman have transferred their New York Plant from 82 Fulton St., New York, to 525 Nuber Avenue, Mount Vernon, N.Y. The latest machinery has been installed in the new plant to facilitate production of a wide range of gold alloys for manufacturing jewellers and industrial users.

Spanish Lead and Zinc.—Spanish production of lead in September totalled 6,130 tons, bringing total lead production for the first nine months of this year to 46,751 tons. Zinc output in September, at 3,306 tons, brought the nine months' total to 26,395 tons.

Angolan Mining Plans.—The Cia. de Aluminio Portugues are planning to construct an aluminium plant at Dondo. It is expected to be operating within two years. The iron mining and railway development project of the Cia. Mineira do Lobito, the main contracts for which were awarded to Krupps and the Danish firm of Hojgaard & Schultz, is not thought to have made much progress.

S.Rhodesian iron ore for Japan.—The Iron and Minerals Development Co., in which the Kobe Steelworks of Japan has an 80 per cent interest, will start shipping iron ore to Japan early next year from deposits situated near Hunters Road Station, between Gwelo and Que Que, in Southern Rhodesia. The contract, which is subject to confirmation, commits the company to delivering the ore at Hunters Road Station at a fixed price. Monthly shipments are expected to range from 10,000 to 12,000 tons of ore but may later rise to 25,000 tons. According to Mr. H. Yuki, who has been in charge of prospecting, mining will be done by the open-cast system on contract and will almost certainly be carried out by Keir and Cawder, the quarrying firm which previously controlled the site. Mr. Yuki is one of a team of five specialists sent to Southern Rhodesia by Kobe Steelworks.

Mt. Isa Plans new Plant.—It is reported from Brisbane that Mount Isa Mines plans to ask for tenders for a new £A9,000,000 ore works, to go into production in mid-1965, which would raise daily treatment rate from 8,000 to 14,400 tons. The plant would treat ore from a new shaft now being sunk, and would include crushing, grinding, flotation and product disposal of lead, zinc and/or copper ores.

South Korea seeks loan.—The South Korean government has plans for raising a loan of U.S. $147,000,000 to aid industrial expansion in 1962-63; in this plan it is proposed to allow $200,000 on graphite mine development.

Germany and Chilean Copper.—During a recent visit to Bonn Mr. Koenig, president of the Cerro de Pasco Co., informed the West German Ministry of Economic Affairs of his company's great interest in German co-operation in opening up the Rio Blanco copper mine near Santiago de Chile. He stated that the mine would be able to supply German copper smelters with ore for many years.

Russian Industrial Development Programme.—In a recent speech to the 22nd Soviet Congress, Mr. Khrushchev forecast that by 1980 the U.S.S.R. would have achieved a metal production of: steel, 250,000,000 tons; aluminium, 4,500,000 tons; copper, 2,500,000 tons; lead, 1,000,000 tons; zinc 1,500,000 tons.

Yugoslav lead-zinc deposit.—Approval has been obtained for the opening up of the lead and zinc ore deposits in the Osogovska Planina range, in Eastern Yugoslavia, near the Bulgarian frontier, with an output of 220,000 tons of lead, zinc and pyrites annually in its initial stages. This total is expected to rise to 300,000 tons. Eventual annual output of zinc and lead concentrates is estimated at 250,000 tons.

Mining in Peru.—The Natomas Co. of U.S. has Congress approval to work the Peruvian gold-bearing deposits of the Sociedad Aurifera San Antonio de Poto, near the Bolivian border. Approval was necessary because the Peruvian Constitution forbids foreign firms to hold or operate mining and land concessions within 50 km. of Peru's international borders. Natomas is to establish a local subsidiary in Peru. Coa. Minerales Santander is to raise production of its open-pit lead and zinc mines in the Andes by 12 per cent. The St. Joseph Lead Co., which owns about 68 per cent of Santander's capital, is to finance the expansion programme.

Canadian Potash Plant Expansion.—International Minerals and Chemical Corp. plan a $10,000,000 expansion programme at their potash mining project at Esterhazy, Saskatchewan, which would bring the company's total investment in shaft and plant to almost $40,000,000. The plant expects to be handling annually 420,000 tons by mid-1962, and the new programme should bring output to 1,200,000 tons a year.

Air Survey Maps of Ontario.—The first set of 20 map sheets resulting from the large-scale airborne magnetometer survey undertaken, which covered 35,000 sq. miles of N.W. Ontario, are now ready for distribution through the Ontario Department of Mines in Toronto at $5 per set.

Harbour Improvement to aid Mt. Isa.—An improvement programme, to cost £A3,000,000 is to be undertaken at the Queensland port of Townsville, to enable the port to load increased exports from Mount Isa.

how CYANAMID products help get the lead out!

AM-9* **CHEMICAL GROUT** helps St. Joe Lead reach deposits by controlling water seepage!

*TRADE MARK

To reach newly discovered lead deposits, St. Joseph Lead Company was faced with the job of sinking large diameter, deep shafts through high pressure, highly permeable, water-bearing Lamotte sandstone. Various grouting methods were investigated. Cyanamid's versatile new chemical grout, AM-9, was selected because it permeated the sandstone, was easy to handle with available equipment and gel time could be closely controlled.

AM-9 has been successfully used by St. Joe Lead in three major shaft sinking operations. In sinking the Viburnum No. 28 shaft, for example, shaft had to bottom in water-bearing sandstone, a drift sump had to be cut and a short spillrock raise driven to the loading pocket. Flow from initial test hole was 60 gpm and static formation pressure was 260 psi. In order to form an impermeable grout curtain around the area, 43,500 gallons of 7.5% AM-9 solution was pumped into a double fence of grout holes, 88' deep. Outer holes were spaced 4' apart, 13' from shaft center. Inner holes were collared 11' from the center and spaced between outer holes. Grouting pressure occasionally reached 1,100 psi but averaged around 400 psi.

AM-9 Chemical Grout quickly sealed the smallest openings and effectively reduced water flow. Grouting was completed in 24 days with significant savings in time and labor.

CYANAMID

CYANAMID OF GREAT BRITAIN LTD

Mining Chemicals Department, Bush House, Aldwych, London, W.C.2. Tel: TEMple Bar 5411

Saskatchewan Mineral plant to re-open.—The Bishopric sodium sulphate plant, of Saskatchewan Minerals, is to re-open by the end of this year, after a rehabilitation programme which cost about $250,000.

Ultra thin tungsten.—A new slicing and lapping technique for making tungsten discs up to 1 in. in diameter and flat to within a tenth of the thickness of a human hair (0.0001 in.) has been developed by the Electrical Contacts and Specialties Division of Fansteel Metallurgical Corporation. The discs are used as the base for semi-conductor devices such as transistors and silicon rectifiers. They are available with light nickel, silver plate or gold-silver alloy coatings.

Water in Copper Production.—According to a recent study of the U.S. Department of the Interior, the copper industry used about 330,000,000 gallons of water daily in the mining and manufacturing of primary copper during the year covered by their review—0.3 per cent of the total estimated withdrawals of industrial water in the U.S., and more than that used by any other major metal. A large part of this amount was used in Arizona, Nevada, New Mexico and Utah, where five-sixths of the domestic copper is mined—all states where water supplies are limited. It has been estimated that over 100,000 gallons of water was used in the production of a ton of copper from U.S. domestic ores.

Japanese visit Goa.—The head of a Japanese mission which has been studying the Goanese mining industry, has stated that all the mines in the Province have rich deposits of good grade ore.

Sarawak Coal.—The president of the Nippon Coal Mining Co. and two representatives of Yawata Iron & Steel Co., of Japan, who have visited the proposed coal mining site at Silantek, Sarawak, have disclosed that the analytical result of the sample of coking coal taken back to Japan was very encouraging.

Japanese Copper interests in Bolivia.—Mitsubishi Metal Mining Co. of Japan plans to invest U.S.$8,770,000 in prospecting and developing copper resources in Bolivia. Mitsubishi have already an option to buy properties in the Oruro Department, where work is reported to be progressing successfully.

Greek Chrome Ore Mine closes.—The chrome ore mine at Domokos, Greece, has been closed after 45 years of exploitation. It is stated that 12,000 tonnes of unsold stocks have been built up at the mine, due to competition from the Soviet Union and the Philippines.

Beryllium Lease in Colorado.—U.S. Beryllium Corporation, owner of the Boomer beryllium mine on Badger Flats, has leased a deposit, known as the California mine, located on Mount Antero near Salida Co.

Uganda Output in 1960.—The Uganda Mines Department notes in its annual report for 1960 that beryl production at 419 tons was almost double that of 1959, due to detailed prospecting in the new and old workings of Ankole district. The Jinja copper smelter produced a record 14,515 tons of blister copper during 1960, with exports totalling 14,712 tons compared with 11,799 in 1959. Wolfram production started up again, and six mines were operating by the end of 1960. The total value of mineral output was £4,517,411 during 1960.

Greenland Mining Concession.—The Danish government has granted Arctic Mining Co. sole rights of exploration and exploitation of metal and mineral reserves in a limited area of eastern Greenland for 50 years. Cryolite, uranium, thorium and other radio-active substances are excluded from the concession rights. Arctic Mining is a joint subsidiary of Nordisk Mineselskab A/S Denmark and American Metal Climax of the U.S., and is expected to concentrate on searching for molybdenum. Nordisk Mineselskab already mines lead and zinc ores on Greenland.

Large Soviet Coal Deposits.—Preliminary estimates fix the amount of coal at Belokamenetsky, one of the deposits of the Altai coal basin in East Kazakhstan, at between 200—250,000,000 tons.

New Finnish Deposit.—A new ore field, reported to contain 42.2 per cent iron, 27.5 per cent sulphur, 0.92 per cent zinc and 0.1 per cent copper, is reported near the Pyhasalmi mine of Outokumpu Oy in northern Finland. A new company, Kalliotuote Oy, has been formed to work this deposit, and is seeking domestic capital for the project; foreign investors may be invited to participate if insufficient capital is available in Finland.

British Goods Shown in India.—The British Board of Trade provided an official British exhibit, which they organized, at the Indian Industries Fair in New Delhi, which opened on November 14.

British Compressor Equipment for Japan.—Twenty Holman Rotair rotary screw compressor air ends have been sent to Tokyo from Camborne, Cornwall, for installation with Japanese diesel engines into portable compressors. This is the first shipment under an agreement signed by Mr. J. F. Holman during a recent tour of the Far East.

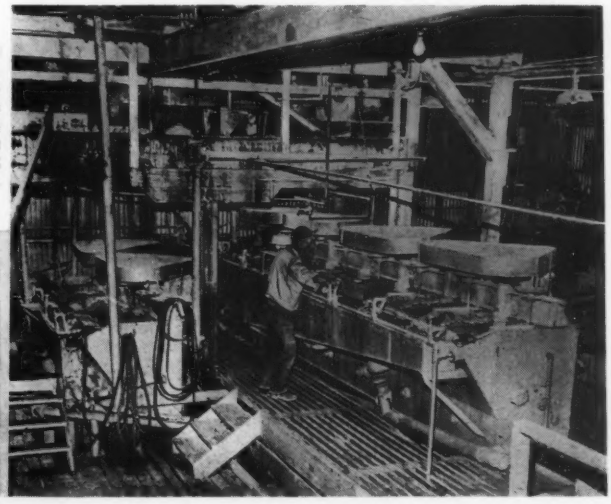
WINDER FOR AUSTRALIA

G.E.C. (Engineering) Ltd. has received instructions from the British General Electric Co. Pty. Ltd. of Australia, to manufacture a double-drum, single-clutch, geared d.c. winder, for Oakdale State coal mine. The approximate value of the contract is £A180,000 and installation is scheduled to take place during the annual holiday period of Christmas 1962. The winder will be used to raise 500 tons of coal an hour from a vertical mine shaft 1,350 ft. deep by means of balanced skips, each with a capacity of 8 tons of coal.

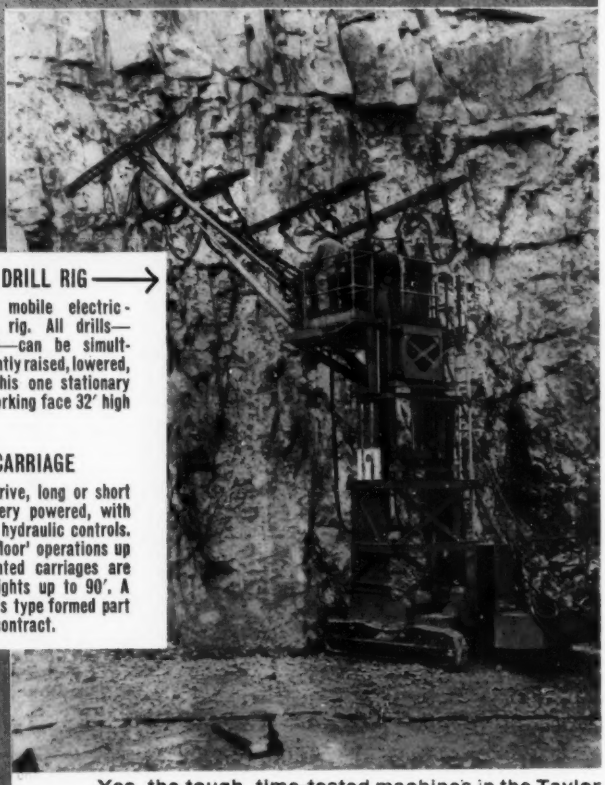
Each drum will be 15 ft. 6 in. in diameter and 5 ft. 9 in. wide, and will be of fabricated steel construction. The winder will be equipped with the G.E.C. positive oil-pressure operated braking system, originally designed to meet British mining regulations; this is the first of its type to be supplied overseas. The winder will be driven through single-reduction double-helical gears by a 2,400 h.p. 470 rev./min. d.c. motor controlled by a Ward Leonard system. A large proportion of the mechanical parts will be manufactured in Australia to G.E.C. design and the remainder will be made at the company's Erith works. All the electrical equipment for the winder is to be supplied by the Witton Works of G.E.C. (Engineering) Ltd.

The winding engine has been designed so that it can be installed on the same foundations as the existing 500 h.p. 10 ft. diameter double-drum winder which it will replace.

The mill and processing facilities at the Molybdenum Corporation of America's Mt. Pass, California, rare earth mine *(seen below)*. **This bastnesite deposit is claimed as the world's largest and makes the United States self-sufficient in these elements. A combination of flotation, acid leaching and roasting is used to produce a high grade concentrate at this compact mill.** *At right,* **flotation tanks in the treatment plant. Flotation is the key to bastnesite recovery at Mt. Pass. See also page 521, "New Uses for the Rare Earths".**



MADE TO MEASURE FOR MINING EFFICIENCY



TELESCOPIC DRILL RIG →

Two-man-operated, mobile electric-hydraulic four drill rig. All drills—percussive or rotary—can be simultaneously or independently raised, lowered, or slewed enabling this one stationary machine to serve a working face 32′ high by 24′ wide.

← SCALER'S CARRIAGE

Two or four wheel drive, long or short boom, diesel or battery powered, with dual platform/chassis hydraulic controls. Ideal for all 'off-the-floor' operations up to 23′. Crawler-mounted carriages are also available for heights up to 90′. A Taylor carriage of this type formed part of £250,000 Russian contract.

TAYLOR MADE MINING EQUIPMENT

Yes, the tough, time-tested machines in the Taylor range can be built to accord exactly with your individual requirements. Years of experience in the design and development of specialist mining equipment have given Taylor unique ability to cope with the most exacting specifications. Proof? Russia recently placed an order for custom-built Taylor equipment worth £250,000.

Why not send for details of the full Taylor range —NOW!

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916

Metals and Minerals

The Firmness of Cadmium

Against the general trend of world commodities cadmium has shown impressive firmness during the past two years. From 10s. per lb. at the start of 1960 Commonwealth metal was raised to 10s. 6d. in March and to 11s. on November 21, and remained at the latter figure for nearly a year. Recently the selling price of U.K. and Commonwealth cadmium was increased to 11s. 6d. a lb. with effect from November 1, 1961, due, as we noted at the time, to the pressure of supply on demand.

For several months the U.K. domestic price has been held at less than the world price, after allowing for U.K. import duty, during which period Commonwealth producers have increased their share of the market at the expense of other exporting countries, notably America. This is a state of affairs which the Canadian sellers would no doubt like to maintain. Despite the latest increase the U.K. domestic price still remains below the world price of 11s. 9d.; hence this market has attraction for sellers of American and Belgian cadmium so long as they are able to dispose of their outputs at the more remunerative prices ruling elsewhere. In view of the declining trend in the rate of arrival of Australian shipments, maintenance of the present U.K. price seems likely to be governed mainly by the availability of Canadian metal.

An application for a rebate of duty on cadmium incorporated by colour makers on exported colours is at present under consideration by the Board of Trade. Sellers of Commonwealth metal, which is not subject to duty, have already offered a parallel facility as from the beginning of 1962.

NEW USES FOR THE RARE EARTHS

According to Mr. Marx Hirsch, president of the Molybdenum Corporation of America, plant-scale work at steel companies has proved the metallurgical and economic value of rare earths in the production of certain major classes of steel. The advantages, it was stated, include fewer surface defects, better sulphur distribution throughout the ingot, and a more uniform chemical analysis. (See also page 519.)

Mr. Hirsch also reported that the company had entered into co-operative arrangements, both in the U.S.A. and in Britain, to develop the use of rare earths as a polishing agent in making plate glass. Test work at manufacturers' and consumers' plants has been successful and production facilities are being installed. It is estimated that this application could open up a "multi-million pound market" for rare earths.

The Molybdenum Corporation's research activities have been extended to include studies on the utilisation of the individual rare earth metals, as well as a new, low cost method of producing rare-earth metals.

Mr. Hirsch referred in the same statement to increased sales of the Molybdenum Corporation's columbium products, in which connection he noted that in the past nine months most large steel companies had started to manufacture columbium-bearing steels. Successful testing of this steel in gas pipe lines was recently announced. Other applications are in trucks, motor cars, road machinery, material handling equipment, gas cylinders and railway trucks.

Columbium's prospects in space exploration are also becoming increasingly bright. According to the *American Metal Market*, a new family of "space age" columbium alloys developed by Westinghouse Electric could prove a major "break-through" if present expectations are realised. Columbium is noted for its strength and corrosion resistance at very high temperatures. Westinghouse's research vice-president, Dr. S. W. Herwald, describes this metal as a "key" space age material. In his view the alloys of no other metal show greater promise as structural materials for manned space vehicles and nuclear-powered space craft of the future. The new columbium alloys may operate at temperatures in the range of 1,800—3,000 deg. F., far above the operating temperatures of the best steels. Their light weight may assist launching of a space vehicle, while their ability to withstand high temperature operation permits safe return of the vehicle to earth in spite of the tremendous friction heat.

Pilot plant production will be started by Westinghouse of a new alloy called B-33, which is a combination of columbium and vanadium. B-33 has moderate strength, coupled with unusual resistance to corrosion by liquid metals, and it can even resist the absorption of neutrons which sustain nuclear reaction. It might thus prove ideal for key components in nuclear-fired space craft and nuclear auxiliary power plants, as well as for heat exchangers or radiators for space craft. Two other alloys to be produced are B-66, a combination of columbium, vanadium, molybdenum and zirconium; and B-77, a combination of columbium, tungsten, vanadium and zirconium.

FRENCH ALUMINIUM OUTPUT JUMPS

Over the first nine months of this year French aluminium output was about 21 per cent higher than in the corresponding period of last year, according to current reports from Paris. Production rose over the period from 169,450 tonnes to 204,500 tonnes, the increase being accounted for mainly by the opening up of new aluminium plants powered by the Lacq natural gas from the south-western French fields. The above figures exclude production in the Cameroons aluminium plant at Edea owned partly by French interests.

★

Electrical applications took a substantially larger portion of aluminium production in the second quarter of 1961 than in the first, according to statistics released by the Aluminium Association. Second quarter shipments of semi-fabricated aluminium products to the electrical field accounted for 11.4 per cent of the total, a rise of 2.8 per cent over the first quarter.

The electrical classification covers such uses as power transmission and dis-

LONDON METAL AND ORE PRICES, NOVEMBER 16, 1961

METAL PRICES

Aluminium, 99.5%, £186 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £230 per ton
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 11s. 6d. lb.
Cerium (99%) net, £18 0s. lb. delivered U. K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 12s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram
Gold, 250s. 0d.
Iridium, £20/£23 oz. nom.
Lanthanum (98%/99%) 15s. per gram
Magnesium, 2s. 2½d./2s. 3d. lb.
Manganese Metal (96%/98%) £275/£285
Nickel, 99.5% (home trade) £660 per ton
Osmium, £17/£22 oz nom.
Osmiridium, nom.
Palladium, Imported, £8 12s. 6d.
Platinum U.K. and Empire Refined £30 5s.
Imported £27 7s. 6d./£27 17s. 6d.
Quicksilver, £59 ex-warehouse
Rhodium, £43/£45 oz.
Ruthenium, £14/£16 oz. nom.
Selenium, 41s. 0d. per lb.
Silver, 80d. f. oz. spot and 80½d. f'd.
Tellurium, 37s. 6d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis	28s. 0d./30s. 0d. per unit c.i.f.
Beryl (min. 10 per cent BeO)	270s./275s. per l. ton unit BeO
Bismuth	30% 5s. 6d. lb. c.i.f.
	20% 3s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semifriable 48%) (Ratio 3 : 1)	£15 5s. 0d. per ton c.i.f.
„ Hard Lumpy 45% (Ratio 3 : 1)	£15 10s. 0d. per ton c.i.f.
„ Refractory 40%	£11 0s. 0d. per ton c.i.f.
„ Smalls 44% (Ratio 3 : 1)	£13 5s. 0d. per ton c.i.f.
Pakistan 48% (Ratio 3 : 1)	£11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10:1) $Nb_2O_5 : Ta_2O_5$	150s./160s. 0d. per l. ton c.i.f. nom.
Lithium Ore—	
Petalite min. 3½% Li_2O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O	76s. 0d./80s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O	75s. 0d./85s. 0d. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (gro d)	£21 0s./£23 0s d/d
Manganese Ore Indian—	
Europe (46%-48%) basis 60s. 0d freight	73d./75d. c.i.f. nom.
Manganese Ore (43%-45%)	69d./71d. c.i.f. nom.
Manganese Ore (38%-40%)	nom.
Molybdenite (85%) basis	10s. 0d. per lb. (f.o.b.)
Titanium Ore—	
Rutile Australian 95/97% TiO_2 (prompt delivery)	£29 10s. per ton c.i.f.
Ilmenite Malayan 50/52% TiO_2	£11 10s per ton c.i.f.
Ilmenite Travancore 58/60% TiO_2	£15/£15 10s. per ton c.i.f.
Wolfram and Scheelite (65%)	106s. 0d./108s. 0d. per unit c.i.f.
Vanadium—	
Fused oxide 95% V_2O_5	7s. 6d./8s per lb. V_2O_5 c.i.f.
Zircon Sand (Australian) 66-67% ZrO_2	£16/£16 10s. ton c.i.f.

tribution equipment, rigid conduit, communications equipment, and capacitors and condensors. This increase brought electrical uses of aluminium into the third rank of importance, edging out the containers and packaging category which now stands in fourth place with a 10.1 per cent portion of shipments for the second quarter.

The major user of aluminium, according to the Association's 47 member companies, continues to be the building products field with 23.8 per cent of second quarter shipments. Second place went, as it has in all previous quarters, to transportation with a share of 13.1 per cent.

★

A report by a government committee places India's probable aluminium requirements by 1965-66 at 115,000 tons, comprising 55,000 tons of electrical grade aluminium and 60,000 tons of commercial aluminium. India's export prospects for aluminium are regarded as favourable.

★

Comalco Industries Pty. Ltd. is stepping up aluminium production substantially beyond the rated capacity of its Bell Bay plant in Tasmania. Only nine months' after acquisition, more efficient operations are calculated to lift this year's output by 25 per cent to well over 14,000 tons. The smelter was originally designed to handle 12,000 tons but was producing about 11,500 tons at the time of the take-over. Further refinements will bring another rise in production to a firm rate of 16,000 tons in 1962.

Expansion will cost more than £A7,000,000, and with the fabricating plants in Sydney it will bring Comalco's investment to £A28,000,000 in existing facilities. The ultimate target of 48,000 tons will be reached in 1965 now that the company has been offered power from the planned Derwent River station.

Tasmania's ability to offer the cheapest power in Australia has been a prime factor in extending the project.

CALL FOR WORLD AGREEMENT ON ALUMINIUM

Four sectors of the U.S. aluminium industry have issued a call for a world agreement to increase the sale and consumption of aluminium. The proposal was presented at a Press conference by Mr. Irving Lipkowitz, chairman of the Reynolds Metals Company, on behalf of the Aluminium Association, the Aluminium Smelters Research Institute, the American Die Casting Institute, and the

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National Association of Aluminium Distributors.

Mr. Lipkowitz said the agreement could be worked out with Government-industry co-operation to see that "equitable competition" applied throughout the industry, both in the U.S. and abroad, with the aim of increasing consumption to the point where the idle capacity of the industry in the U.S., Canada, and throughout the non-communist world could be fully utilised.

He envisaged a series of Government-industry conferences to establish "an orderly pattern of marketing" of aluminium and aluminium products in the U.S., in Europe, in Japan and in other parts of the world.

PHILIPPINE NICKEL FOR JAPAN

The Philippines has shipped 45 tonnes of nickel platinum concentrates to Japan, the first shipment of its kind in Philippine mining history.

A spokesman for the A. Coje Mining Company Incorporated said the shipment contained 21 to 23 per cent pure nickel, claimed to be one of the highest percentages in the world.

CANADA'S FIRST COLUMBIUM SHIPMENTS

St. Lawrence Columbium and Metals Corp. is producting columbium concentrates from columbium - tantalum - rare earth deposits in the Oka district near Montreal (see *The Mining Journal*, Jan. 27, 1961, p. 99, and June 23, 1961, p.723). The company recently made its first tonnage shipment of 53 per cent columbium concentrates to a major producer of ferro-columbium and columbium alloys at Niagara Falls, N.Y. Shipments are also being made to France, Germany and Japan where interest in columbium and its alloys is expanding.

The company's new mill, which went into pilot production in September, is now running at about 60 per cent of rated capacity, equivalent to some 500 tons of ore per day. Next year sales are expected to reach $2,000,000, including marketing of by-product materials used by the cement and fertilizer industries.

UNCERTAIN OUTLOOK FOR QUICKSILVER

The downward drift in the quicksilver price persists. Today, the London ex-warehouse price was quoted at £59 per flask compared with £60 previously. The last change occurred on October 23 when it was reduced by a similar amount.

In just over a year, the price has dropped by £11 10s. It was towards the end of last year when Russia entered the United Kingdom market for the first time for a great number of years, possibly not since World War I. More recently China has figured more prominently as a supplier to Western Europe. In September some 304 flasks of Chinese metal arrived in the U.K. for the first time for a considerable number of years and several more lots, it is understood, are expected to arrive over the rest of this year. By then it has been estimated that up to possibly 1,000 flasks will have come in. Some of it will probably be re-exported, but part may be available for sale here. It is believed that the c.i.f. value of the September arrivals was about £58 10s. per flask. But the market has weakened since then, and some quarters mention the c.i.f. price down to about £56.

Russia does not appear a willing seller at current levels, but it would be unwise to bank too much on this. It has been hinted that both China and Russia might each be prepared to offer 500 flasks monthly over the first half of next year. Since November, 1960, when the first lot of Russian metal entered the U.K., 5,534 flasks had arrived by September last.

The Spanish and Italian producers are still seemingly not prepared to compete at present levels, although it remains to be seen how much longer they can remain out of the U.K. market.

*

Italy exported 791.6 tonnes of quicksilver during the first eight months of 1961 compared with 1,090.8 tonnes in the same period a year ago, according to the Central Statistical Institute.

SELENIUM IN ADEQUATE SUPPLY

Rumours of a pending shortage of selenium were the subject of a recent statement by the U.S. Copper Association, which assured consumers that they need have no fear of such a contingency "in the foreseeable future". The views

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expressed by the Association reflect the consensus of opinion at a recent meeting of selenium producers and consumers with the Business and Defence Services Administration in Washington. The seven leading U.S. producers of selenium are members the Copper Association.

According to *The American Metal Market*, the rumours in question were probably motivated by an impression given by statistics which are now past history, namely that U.S. producers' inventories at the end of 1960 were only 273,000 lb., while shipments by producers to consumers during 1960 totalled 651,000 lb. During the first six months of the current year, however, the trend as indicated by Bureau of Mines Statistics has been in the other direction, production exceeding shipments by some 75,000 lb. Other factors possibly contributing to the rumours were relatively strong scrap prices, some export activity, and the possibility that the new free machining steels using a small percentage of tellurium might substitute selenium for the former material. Then again, research is pointing to the possible use of selenides for refractory coating of space structures, but such an application appears to be far in the future and might not require significant amounts.

Producers have also pointed out that no recognition is given in the Bureau of Mines statistics to the inventory of selenium in the hands of producers in other than refined or saleable form. Actually, the selenium intake of both U.S. and Canadian producers, for several years, has been considerably in excess of demands. The statement adds that this surplus, which represents several years of U.S. domestic production at its current level, is being stockpiled by the producers in the form of readily recoverable residues or semi-processed materials. Selenium refinery capacity in both the U.S. and Canada is sufficient to process a tonnage of selenium considerably in excess of present rates of production.

ANTIMONY PLANT FOR BOLIVIA

The erection of an antimony smelter with an initial capacity of 3,400 annual tonnes is to be carried out in Bolivia by Sociedad Mixta Metalúrgica Vinto. This company has been formed for this purpose by the Bolivian metallurgical concern Compañia Metalúrgica Vinto and the banking house Banco Minero de Bolivia. The Czech foreign trading corporation Technoexport, of Prague, is stated to have made an offer to supply all machinery and equipment against eight to ten-year credit.

Copper · Tin · Lead · Zinc

(From Our London Metal Exchange Correspondent)

Stocks in L.M.E. official warehouses at the beginning of the week show a fall in copper and rises in tin, lead and zinc.

MT. ISA WORKERS ORDERED BACK

Copper stocks in L.M.E. official warehouses fell by 120 tons to 15,215 tons. On the L.M.E. there is now a backwardation of 5s. to 10s. After a rise of about £2 in anticipation of more Chilean labour troubles, prices came back to about the same level as at the beginning of the week, the news from Chile indicating that agreement would, in fact, be reached this week between the mine owners and workers at El Salvador and Potrerillos and that a strike was unlikely. From Santiago, however, it is reported that workers at Chuquicamata are demanding a 40 per cent increase, which is the same as originally demanded at El Salvador and Potrerillos. The Chuquicamata workers' present contract expires on December 31. The market has since recovered the £2 on indications of better Continental demand and a rather bullish interpretation of the latest Copper Institute figures.

At Mount Isa many hundreds of workers have returned to the town following the Industrial Commissioners orders to Union members to return to work by November 20.

During the week two U.S. custom smelters are reported as having reduced their buying price for scrap to 24½ cents per lb. The Copper Department in Santiago reports production by the large Chilean companies during October as 46,084 tons compared with 28,945 tons in September and 23,646 tons in October, 1960. The following figures (in tons) for October have been issued by the Copper Institute in New York. September figures in brackets:—

In U.S.:

Refined production	145,425	(126,023)
Domestic deliveries	130,364	(126,793)
End month stocks	76,785	(79,939)

Outside U.S.:

Refined production	176,710	(155,919)
Deliveries fabricators	189,430	(178,335)
End month stocks	336,451	(325,853)

Copper sales by ENAMI during the past week for the account of small Chilean producers totalled 373 tons.

TIN PRICES FALL, STOCKS RISE

Tin stocks in L.M.E. official warehouses rose by 116 tons to 4,335 tons, the first increase since April. On the L.M.E. a contango of about £7 has developed, whilst prices have fallen over the week by about £10 for cash and £4 10s. for forward metal. The fall is attributed to a general lack of consumer demand.

From Washington the G.S.A. have announced the sale of 150 tons of Longhorn Grade B tin; bids for 850 tons Grade A tin were not accepted as prices offered were considered too low.

Stasistics from the International Tin Council show that in September production of tin in concentrates in Malaya at 4,580 tons was practically unchanged compared with August. Output in Thailand dropped from 1,241 tons in August to 1,025 tons in September, whilst Bolivian production fell from 1,800 tons in July to 1,594 tons in August. Production in Nigeria rose from 654 tons in August to 768 tons in September. Smelter production of tin metal in the U.K. rose from 1,842 tons in August to 2,282 tons in September. Belgian production fell from 605 tons in August to 538 tons in September. On Thursday the Eastern price was equivalent to £975¼ per ton c.i.f. Europe.

SMALL TURNOVERS IN LEAD-ZINC

Lead stocks in L.M.E. official warehouses rose by 284 tons to 10,709 tons. On the L.M.E. the contango is now about 27s. 6d. and prices over the week have fallen by about 25s. 0d., reflecting the lack of consumer interest and the half-cent fall in the American price. Prices have been at their lowest since the L.M.E. re-opened after the war.

Zinc stocks in L.M.E. official warehouses rose by 225 tons to 10,849 tons. On the L.M.E. the contango remains steady at about 25s. Prices fell away during the week but have since recovered. Little market interest has been shown in the metal. During the week the Board of Trade announced that they were offering 880 tons of zinc for sale by tender with delivery and pricing between December, 1961 and April, 1962; all is high grade or special grade. After this has been disposed of the Board of Trade will have left around 2,000 tons for sale by public tender.

In New York the American Zinc Institute states that U.S. production in October was 81,402 tons compared with 68,003 tons in September and 63,005 tons in October, 1960. Shipments in these months were 96,383 tons, 91,029 tons and 65,183 tons and end of month stocks 150,083 tons, 165,064 tons and 190,288 tons respectively.

Advance statistics issued by the British Bureau of Non-Ferrous Metal Statistics show that U.K. consumption of zinc in all forms during September was 28,778 tons compared with 21,501 tons in August. Consumption in the first nine months of this year is given as 254,692 tons, which is 194,449 tons less than in the corresponding nine months of 1960. Stocks of slab zinc at the end of September were 69,491 tons compared with 70,637 tons at the end of August.

From one source in the U.S. the opinion has been expressed that the subsidy programme for small lead and zinc producers may substantially increase the domestic output and result in a drop in the price of both metals.

OFFICIAL TURNOVERS

Official turnovers (in l.tons) for the week ending November 10, 1961, with the previous week's figures in parentheses, are:

Copper	...	13,600	(13,400)
Tin	...	1,970	(2,580)
Lead	...	7,800	(9,100)
Zinc	...	8,775	(4,925)

Closing prices are:—

	November 9 *Buyers*	*Sellers*	November 16 *Buyers*	*Sellers*
COPPER				
Cash	£231¾	£232	£229	£229½
Three months ..	£232	£232¼	£228¾	£229
Settlement ..	£232		£229½	
LEAD				
Current ½ month	£60¼	£60¼	£58¼	£58½
Three months ..	£61	£61¼	£59½	£59⅝
TIN				
Cash	£972½	£973½	£963½	£964½
Three months ..	£972	£973	£970	£971
Settlement ..	£973½		£964½	
ZINC				
Current ½ month	£68½	£68¾	£67½	£67½
Three months ..	£69¼	£69½	£68⅛	£68¼

Mining Finance

Rhoanglo's Faith in the Federation

In his statement to Rhoanglo stockholders, Mr. H. F. Oppenheimer has again re-affirmed his faith in the Rhodesian Federation and the group continues to invest new funds in expanding its mining operations in Northern Rhodesia. There are three major schemes, the metallurgical plant at Nchanga is being extended to produce an additional 300 tons per month without additional mining; the tonnage milled at Bancroft is to be increased from 150,000 tons per month to 220,000 tons at a cost of some £6,500,000 and at Rhodesia Broken Hill the installation of the Imperial Smelting furnace is almost complete. In all, these projects represent a capital investment of some £15,000,000.

Outside of the mining sphere the group has invested, since year end, some £280,000 in the Hippo Valley Estates. This company has expanding sugar and citrus interests and in its work is opening up new areas to irrigation.

In the mind of the British investing public, however, the dominant factor which commands most attention is the political issue, and at present the major copper mines, where the conventional mining risk must be negligible, are standing at a yield, net of Rhodesian tax, of about 16 per cent. This *political* discount seems over-rated, particularly as there now seems little chance of exchange controls being extended to non-residents holdings (see page 528).

These low prices have particularly affected Rhoanglo for they have meant that many of the option rights carried by the loan stock offer have not been converted for cash. Holders have preferred the alternative method of surrendering loan stock. This has meant that, to a considerable extent, the cash flow which had been expected from these options has not materialized and the group has therefore had to provide from its own resources the funds needed to follow up its investments. In view of this it is satisfactory that the dividend has been maintained and that £1,876,571 has been transferred to the general reserve.

However, it must not be overlooked that to a small extent Rhoanglo "lives in the past". This is particularly so with respect to its holding in Bancroft where Rhoanglo's results this year reflect Bancroft's previous year. Similarly with its holding in Mufulira where Rhoanglo's current year reflects the interim dividend from Mufulira's current year and the final dividend from its previous year. The dividends received from Nchanga also are the result of a slightly earlier trading period as Nchanga's financial year ends on March 31.

Comparing the results of the year under review with those for the current year which have already been declared; Bancroft's dividend has been reduced from 1s. to 9d. whilst the Mufulira final has been reduced from 3s. 3¾d. net to 2s. 4.8d. net. To put these facts into perspective the dividends from these two companies represented a little more than 11 per cent of Rhoanglo's total revenue during the past financial year. The bulk of the remainder of revenue is made up from dividends in Rhokana and Nchanga, the first of which is discussed below.

On the present London price of 55s. Rhoanglo's yield 14.2 per cent net of Rhodesian tax, whilst the value of the net current assets, with quoted investments valued at the market price of June 30, is some 70s. per share. The market price of Rhoanglo's at that date was 53s. 3d.

A discount between the net assets value and the current share price is quite normal but it is seldom as large as this. It would appear therefore that in Rhoanglo the political background is discounted more than once. Firstly with the current price of its individual investments and secondly in the valuation of its portfolio through the price of its own shares.

Rhokana

Perhaps the most significant point about the 1961 Rhokana report is the fact that working costs have been reduced by about £8 per ton. Whilst this was no doubt due in part to the reduced labour costs resulting from the employees "copper bonus" scheme which is a function of the profitability of all the Copperbelt mines, it is certainly a creditable performance in these days of generally rising costs. Due to the involved arrangements whereby Rhokana smelts concentrates for several other companies it is not possible to assess the actual working costs from the annual report, the costs, however, appear to be in the order of £168 per ton and the cost reduction therefore represents some 5 per cent. It is, in fact, surprising that Rhokana do not publish their operating costs despite the many excellent precedents for doing so.

This reduction in costs off-set to some extent the reduced mining income as a result of the generally lower prices received for copper on the London exchange and the voluntary sales cut-back of 10 per cent. Over the full year the gross profit from mining operations was £6,400,000, some £1,900,000 less than the previous year. The earnings from investments, however, increased by £650,000 to £4,870,000; this was mainly the result of the Bancroft maiden dividend and the increased final dividend from Mufulira for the year ended June 30, 1960. The total net profit for the year was £10,955,993, from which £1,500,000 was appropriated for capital expenditure, £250,000 to general reserve, and £260,000 as additional provision for income tax on previous year's profits. The maintained dividend of 7s. per stock unit absorbed £8,750,007.

The additional taxation is due to the increase in the Federal taxation rate. It has now been announced that the tax dispute which concerned the period of 1958/59 when Rhokana and Nchanga produced copper on behalf of Bancroft, has been settled. The Federal Supreme Court has decided in favour of the companies. The

London Market Highlights

The revival of investment interest which has been quietly growing in Kaffirs for the past two months or so strengthened considerably this week. Buying which has hitherto been very selective in fact broadened throughout all sections of the gold share market. Several factors were at work in the background. For instance the popular Press has apparently not found any news of racial unrest in the Republic that it could enlarge upon for a long time now. Furthermore, there has been the undeniably impressive recovery in South Africa's exchange reserves coupled with the first signs of an easing in exchange restrictions as shown by the decision to relax certain import controls. To complete the picture there has been the latest increase in the U.S. payments deficit.

The possibility of a fresh run on the dollar did not touch off the usual wild gold price rumours—the current recovery appears to be more soundly based than that—but it did attract some attention to the older mines such as Durban Deep which rose 1s. 6d. to 27s. 6d. and Grootvlei which were similarly dearer at 17s. 9d. Venterspost, considered a good two-way bet as far as higher gold prices benefits and existing earnings prospects are concerned, moxed up 1s. 3d. more to 23s.

It was the finance issues, however, which came in for the bulk of the buying. As usual, Gold Fields were firmly in the lead with an advance of 4s. 9d. to 60s. in very active trading. They were closely followed by Union Corporation (58s. 9d.) and "Johnnies" (51s. 3d.), both of which moved up 2s. 9d. Outstanding in a generally firm O.F.S. group were Western Holdings with a jump of 5s. 7½d. to 123s. 9d. St. Helena moved up 1s. 10½d. to 68s. 1½d. and two stocks which have moved little in recent times, Presidents Brand and Steyn, came to life with rises of 2s. 1½d. to 53s. 9d. and 1s. 3d. to 14s. 9d., respectively.

Oddly enough, De Beers with their important Kaffir interests, played little part in the movement. Much more interest was seen in "Casts". It was confidently expected that the Ghana and Sierra Leone diamond producer's pending results would be good and some quarters thought that an improvement on the already forecast final would be made. The shares jumped 1s. 6d. to 17s. immediately prior to the results, but reacted to 16s. 7½d. when it was learned that although the profits were up to best expectations, the directors had stuck to their dividend forecast. Later came a strong recovery, the mine reaching 19s. on the view that the company may have something like £8,000,000 in cash in London now as a result of sales from its Ghanaian diamond stocks.

The Copper group remained steady for the most part. Nobody was very keen to operate either way pending the Anglo American group annual reports and chairman's statements, an influx of news which is to be followed in a few days by similar announcements from the R.S.T. group together with the September quarterly reports.

In the Australian section, the gold issues hardened a few pence in sympathy with the revival in Kaffirs, Lake View gaining 9d. to 22s. 3d. The lead-zinc producers which had fallen so sharply following the reduced interims also began to improve. Consolidated Zinc rallied to 51s. 3d., the move being partly a reflection of the firmer market in U.K. industrials. Elsewhere, the tin section remained very firm although some hesitancy in the metal price slowed down the impetus of the recent advance. Gopeng gained 1s. 6d. more to 47s. 6d. and in further response to the excellent results Sungei Besi rose a similar amount to 46s.

amounts involved are £293,000 for Rhokana and £519,000 for Nchanga; no provision had been made in the accounts for these liabilities.

On the production front 1960/61 was a year of achievement for Rhokana. For the second year in succession a new production record was set at the smelter and the average daily milling rate was increased from 14,458 tons to 15,619 tons. Underground, the policy of increasing the production at the Mindola section in order that the three sections can be worked at a rate proportionate to the known reserves, has also been implemented. This increase of 34 per cent in the tonnage hoisted at Mindola has been made possible by the new No. 2 shaft. Two refrigeration units have been commissioned at Mindola and preparations are being made for the installation of similar units underground at Nkana; these together with the new fans commissioned at V5 shaft and No. 6 shaft mean that Rhokana is now well placed to continue mining with efficiency at the greater depths. At present the deepest stoping level at Rhokana is 2,880 feet.

Bancroft

By contrast with Rhokana 1960/ was not a happy year for Bancroft. Being a higher cost producer, the effect of the generally lower copper prices was more marked and Bancroft did not have the opportunity for reducing working costs. In fact the reverse occurred, this was mainly due to three factors. The grade fell from 4.29 per cent to 3.82 per cent, stope scraping increased from 30 per cent to 60 per cent of all ore mined due to the flatter nature of the orebody in the area mined, and charge increased by some £50,000 mainly due to increased pumping.

Pumping continues to be one of Bancroft's major problems, at present they are pumping a total of 31,790,000 gallons per day, more than Rhokana and Nchanga together. The problem of dewatering continues to control the rate of development and in turn the production programme.

Looking to the future, Bancroft is faced with a heavy capital expenditure programme which is designed to increase production to some 63,000 tons of copper per year. This will be done by opening up the No. 3 shaft area and it has been estimated that it will cost £6,500,000 to raise the mill tonnage to 220,000 tons per month. Of this amount the chairman has said that £2,625,000 can be raised by calling upon option holders. As the programme is to be spread over three years it is possible that a decision has not been taken on how the rest should be raised but unless there is a startling increase in market trends within the next twelve months this additional money must either be taken from profits or by raising further loans. Whichever method is adopted a further dividend cut in the current year does not seem unlikely.

RAPID DEVELOPMENT REQUIRED

In 1956 Harmony was milling an average of 75,000 tons per month. Since that time the milling rate has gradually been increased and during the year ended June 30, 1961 an average of 176,000 tons were milled, the actual rate at the end of the year being up to the plant's rated capacity of 200,000 tons per month. Throughout this period the development has kept pace with this additional milling but with the sale of approximately 397 claims to Virginia earlier this year Harmony has lost a number of its actual and potential working faces. The total ore reserves have been reduced by 644,000 tons at 7.8 dwts. following the sale of the "A" area.

Harmony is now developing rapidly to replace these faces and a development programme has been started to open up the area to the south and west of No. 3 shaft. Initially, much of the development in opening up this area will be done off-reef and it may be some while before its potential is known. The results to date, however, are not very encouraging, the lower percentage payability in the September quarter being due to the results from this new area. It is possible that it was these poor results that inspired the chairman's note of caution when he warned that it may not be possible to maintain the present milling rate.

If a reduction in the milling rate is found essential this will obviously affect profits and in the long-term could well mean a reduction in dividend but there does not appear to be any immediate danger, even though Harmony will start paying tax during the current year. The main commitments during the year are capital expenditure estimated at R2,000,000 and the repayment of the final instalment of R1,000,000 of the Central Mining loan.

The present Johannesburg price of Harmony shares is 254 cents. Making an allowance for the present value of the tax free capital repayments, eleven further payments of 3 cents each, the shares have a yield of 12 per cent. On the same basis the gross yield on the London price is 14.4 per cent.

CONS MAIN REEF

Whilst the life of C.M.R. must remain in the short life category, its actual operating life has been increased somewhat by the decision to retreat an increased tonnage from surface accumulations. An extensive sampling programme has shown that it will be profitable to retreat an old slimes dam to the north of the reduction works.

Meanwhile operations underground continue on a reduced scale. The tonnage milled during the past year was little more than half that milled in the previous year. Increased grade from selective mining has partly off-set the increasing costs but the working profit for the year has fallen from R157,414 to R75,359. Clean-up operations contributed a further R62,750 from the recovery of an additional 2,500 ounces; 3,000 ounces were recovered the year before.

A RECORD YEAR FOR BLYVOOR

Although Blyvooruitzicht is not as rich as its neighbour West Driefontein it has also had records in most spheres of its operations during the past year. They included both tonnage and profit records.

In his annual review the chairman, Mr. T. Reekie, has described in some detail the layout of the primary development of the mine. The four "A" sub-incline shafts which serve the mine between the 5,000 feet and the 6,200 feet horizons are almost complete, the only remaining work being the mining of the ore and waste passes. Preparations are now being made for the "B" series of sub-inclines which are to serve the mine to the lowest levels and the new No. 4 vertical shaft from surface, which provides the final link between the workings and the mill, is now at a depth of some 2,554 feet. The capital expenditure, primarily on these projects, is estimated to be R4,600,000. A description of the primary layout of the mine is interesting, and indeed valuable, but it could be very much more useful if it were accompanied by a section of the mine workings as well as the small scale plan.

Blyvoor has now reached the stable stage. The taxation level is already as high as it is likely to rise and capital expenditure should not encroach upon the dividend rate. On the present London price of 27s. the gross yield is 9.4 per cent. If allowance is made for full double taxation relief (Blyvoor's tax rate is 11s. 1d. in the £) then this yield becomes almost 19 per cent.

CASTS DIVIDEND UP TO FORECAST

The group profits of Consolidated African Selection Trust have increased by £1,360,000 ton £4,767,000. A final dividend of 2s. 3d. brings the total as forecast to 3s. The final for the previous year was equivalent to 2s. 4d. After paying increased taxation the net profit for the year was £2,267,000 of which £900,000 has been been transferred to reserves.

During the year capital expenditure amounted to £922,000 of which £380,000 represents capital expenditure financed from taxed profits. The larger appropriation to capital reserve was in view of this and further anticipated requirements.

SUNGEI BESI DIVIDEND

A final dividend of 9d. per share has been recommended. The preliminary results show that the profit for the year ended March 31, 1961, is more than double the previous year's figure at £235,897. Of this net profit £210,367 has been absorbed by dividends and £20,000 has been transferred to general reserve.

KENNECOTT EARNINGS DOWN

Few large mining concerns are free from labour troubles, whether they operate in highly industrialised areas of in comparatively backward countries. The Kennecott Copper Corporation is no exception and, in fact, the significance of their labour trouble is such that it is highlighted in the consolidated statement of income by the item "Shut down expenses during strikes".

In the first nine months of the current year this item is entered at $3,155,321, or almost 6 per cent of the net income for the period. This in itself is a substantial figure but does not, of course, take into account the lower income due to loss of production. Overall, the net income for the first nine months of the year, compared with same period of the previous year, has been reduced from $5.68 to $4.32 per share.

Earnings from the production of copper in the United States remained at about the same level, the increased sales volume off-setting the generally lower copper prices. However, the income from Chile was substantially lower. A major factor was the lower prices but the higher costs and the reduced shipments due to two strikes were also important factors.

In August a surcharge of 5 per cent imposed on Chilean income taxes and in October a further surcharge of 8 per cent was enacted. The former is not effective until 1962 whereas the latter applies to 1961 taxes. These taxes, which were discussed in *The Mining Journal* on September 8, have been imposed in

order to meet the wage and salary increases for the Chilean armed forces and the civilian employees in both the public and private sectors.

CONTRASTING REPORTS FROM "MALAYAN" TWINS

Southern Malayan Tin Dredging is increasing its dividend from 2s. 6d. to 4s. per share whilst Malayan Tin Dredging has been forced to cut its dividend by 6d. to 2s. per share. Whilst it is no surprise that these companies have such widely differing results, despite the rise in the tin price which is necessarily common to both, it was not generally anticipated that Malayan would be forced actually to cut its dividend. This reduction is due to the fall in profits from £609,406 to £416,050 which is directly the result of the lower production at 2,751 tons compared with 3,300 tons for the previous year. The general level of production should improve once the two dredges, which are working through poor ground, return to normal values.

With the increased dividend Southern Malayan are paying out almost the total of the year's profits after taxation of £723,083 compared with £431,353 for the previous year.

CAPITAL EXPENDITURE AT AMALGAMATED TIN

The Profit and Loss account for Amalgamated Tin shows an increase in revenue of £1,000,000 and as a result the net profit has been doubled to £741,671. This overall increase is due to two factors, firstly the company has been able to operate for almost the full year without the imposition of tin restriction, and secondly, with the better demand for columbite during the earlier period it was possible to dispose of certain stocks.

As a result of this increase in revenue the directors have been able to increase the total dividend from 20 per cent to 25 per cent. By so doing, however, they have retained and appropriated to general reserve £137,000. This is part of a five year plan to purchase new earth moving equipment in order that outputs in the future can be maintained at economic levels. It is estimated that this programme will cost £1,000,000.

The present machines, Bucyrus walking draglines, have been in service for about 25 years and their cost today is many times what it was before the war. It is therefore understandable that the depreciation provisions that have been made in the past are now inadequate. However, as these machines, five in all, were installed within a short period it seems likely that once two have been replaced by the present 5 year programme it will then be necessary to replace the other three at a similar if not even greater expense.

The capital expenditure for the current year, which forms part of the £1,000,000 total, is estimated at £463,000 and in addition there will be the usual replacement on other capital items, estimated at £200,000. Whilst the new earth moving equipment should improve the efficiency of operations, this heavy capital expenditure will be a burden on profits for some years to come.

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The British South Africa Co. announces that Sir Frederick Crawford has been appointed a director of the company.

Rand and Orange Free State Returns for October

GOLD OUTPUT AND PROFIT

Company	Oct. 1961 Tons (000)	Oct. 1961 Yield (oz.)	Oct. 1961 Profit† (R000)	Year ends	Current Financial Year Total to date Tons (000)	Current Financial Year Total to date Yield (oz.)	Current Financial Year Total to date Profit† (R000)	Last Financial Year Total to date Tons (000)	Last Financial Year Total to date Yield (oz.)	Last Financial Year Total to date Profit† (R000)
Gold Fields										
Doornfontein	125	54,069	631·5	J	499	215,255	2,520·2	420	172,526	912·4
Libanon	119	31,531	197·8	J	476	122,977	727·0	468	111,820	278·0
Rietfontein	12	3,102	3·5	D	120	31,956	30·7	155	40,658	114·7
Robinson	50	9,870	3·4	D	454	97,815	29·1	449	99,356	23·8
Simmer & Jack	71	12,365	1·8	D	704	125,445	9·5	757	134,528	L75·2
Sub Nigel	66	15,155	25·4	J	266	60,481	103·5	266	60,775	127·4
Venterspost	130	39,351	211·6	J	515	155,950	828·2	496	138,441	638·9
Vlakfontein	53	19,631	185·1	D	525	194,038	1,859·8	516	185,584	1,762·8
Vogels	80	17,293	24·2	D	805	172,888	367·9	855	183,586	410·6
West Drie	182	142,879	2,441·5	J	726	568,924	9,758·9	520	493,401	8,706·0
Anglo American										
Brakpan	146	18,978	66·2	D	1,435	173,266	520·0	1,432	173,443	259·1
Daggas	228	46,013	450·0	D	2,258	456,909	4,522·8	2,308	466,539	4,542·0
East Daggas	109	18,934	90·8	D	1,177	184,663	858·1	1,057	179,604	825·1
F. S. Geduld	100	87,910	1,427·7	S	100	87,910	1,424·7	93	77,429	604·6
President Brand	133	102,789	1,730·0	S	133	102,789	1,730·0	117	96,233	1,704·9
President Steyn	114	42,651	334·6	S	114	42,651	334·6	104	41,288	391·5
S. A. Lands	110	22,387	100·1	D	1,086	219,730	1,013·5	975	202,696	918·9
Springs	99	14,354	50·7	D	946	134,611	407·5	1,007	139,887	283·3
Vaal Reefs	123	57,810	587·2	D	1,097	514,150	5,470·7	992	448,452	4,720·9
Welkom	107	34,291	145·8	S	107	34,291	145·8	98	30,949	158·7
Western Holdings	175	123,375	2,114·7	S	175	123,375	2,114·7	136	86,340	1,373·2
West Reefs Ex.	155	45,182	310·4	D	1,513	440,409	3,010·2	1,393	393,888	2,611·3
Central Mining										
Blyvoor	142	88,119	1,324·2	J	565	351,177	5,300·1	539	349,969	5,325·2
City Deep	117	24,456	3·1	D	1,148	236,830	42·8	1,148	234,506	107·0
Cons. M.R.	38	8,501	3·0	J	155	34,978	12·2	226	46,002	32·1
Crown	171	29,826	L6·1	D	1,797	313,584	17·7	2,004	339,546	127·6
D. Roodepoort	206	38,744	109·9	D	1,949	362,820	1,016·7	1,931	353,150	1,005·3
East Rand Prop.	233	56,415	215·2	D	2,370	543,813	1,604·6	2,230	540,862	1,656·1
Harmony	197	79,541	755·3	J	795	320,530	3,087·4	670	270,415	2,539·4
Modder East	64	6,135	L1·9	J	250	25,429	L2·8	517	50,460	L·4
Rose Deep	25	4,295	1·3	D	234	41,079	L1·3	244	42,917	18·5
J.C.I.*										
Freddies Cons.	65	12,589	L36·7	D	639	131,426	L427·9	608	133,444	L774·5
Govt. G.M.A.	32	7,451	L17·0	D	383	80,125	L170·7	527	107,323	10·4
Randfontein	16	2,814	1·1	D	169	30,398	13·5	230	45,152	53·5
Union Corporation										
East Geduld	122	34,282	412·2	D	1,255	355,493	4,294·5	1,319	385,659	2,468·5
Geduld Prop.	74	12,327	28·1	D	780	126,268	394·7	752	130,646	498·0
Grootvlei	230	48,840	469·0	D	2,197	455,889	4,480·2	2,180	453,115	4,674·5
Marievale	99	23,523	237·9	D	986	236,717	2,407·2	987	241,553	2,536·9
St. Helena	187	65,454	863·3	D	1,841	645,301	8,331·4	1,654	563,329	7,041·7
Van Dyk	74	10,601	6·1	D	741	114,022	108·2	737	120,651	174·3
Winkelhaak	98	33,321	357·3	D	958	325,951	4,512·7	878	281,115	2,784·1
General Mining										
Buffelsfontein	157	69,491	780·1	J	620	272,536	3,070·2	589	242,604	2,643·2
Ellaton	23	5,521	26·5	D	240	56,540	295·1	283	66,987	493·7
S. Roodepoort	30	7,314	44·5	J	121	29,392	180·6	122	29,174	188·9
Stilfontein	190	184,960	883·4	D	1,794	809,081	8,640·7	1,622	732,866	7,817·1
W. Rand Cons.	138	20,796	34·4	D	1,349	199,742	344·2	1,328	191,315	182·9
Anglo Transvaal										
Hartebeestfontein	136	62,560	687·1	J	644	250,036	2,780·9	478	222,568	2,567·7
Loraine	85	29,537	146·5	S	85	29,537	146·5	820	16,400	L36·3
Rand Leases	163	23,309	L10·1	J	727	100,553	L55·9	764	109,832	75·1
Village M.R.	35	4,488	L2·7	J	145	17,689	L11·8	118	17,139	L30·3
Virginia O.F.S.	136	27,921	28·9	J	562	111,846	L208·7	451	95,430	L265·3
Others										
N. Kleinfontein	71	9,937	2·5	D	721	100,685	46·6	790	101,724	13·3
Wit Nigel	19	4,279	6,534	J	77	17,104	26·7	80	17,735	42·7

Gold has been valued at R24·96 (September R24·99) per oz. fine. L indicates loss. † Working Profit. Table excludes profits from Uranium, Pyrite and Acid, and also production from Uranium divisions at Randfontein and W. Rand Consolidated. *Working profit includes Sundry revenue.

ESTIMATED URANIUM REVENUE

Company	Year ends	Oct. Profit (R000)	This year (cum.) (R000)	Last year (cum.) (R000)	Company	Year ends	Oct. Profit (R000)	This year (cum.) (R000)	Last year (cum.) (R000)
Gold Fields					**J.C.I.**				
Doornfontein	J	30·0	126·0	120·0	E. Champ d'Or (*a*)	D	9·0	94·1	134·5
Luipaards Vlei (*a*)	J	268·0	1,066·0	759·4	Freddies Cons. (*b*)	D	67·0	651·0	648·0
Vogels	D	105·0	1,086·0	1,078·0	Govt. G.M.A.‡	D	30·0	372·0	460·8
West Drie	J	105·0	412·0	392·0	Randfontein (*b*)(*c*)	D	279·8	2,784·4	2,094·9
Anglo American					**General Mining**				
Daggafontein (*b*)	D	260·0	2,559·0	2,811·9	Buffelsfontein (*d*)	J	250·9	1,017·6	1,694·0
P. Brand (*b*)	S	92·0	92·0	84·3	Ellaton (*d*)	D	3·5	37·2	336·0
P. Steyn (*b*)	S	129·0	129·0	115·2	Stilfontein (*d*)	D	10·8	273·0	1,772·0
Vaal Reefs (*b*)	D	152·0	1,481·8	2,832·2	W. Rand Cons. (*d*)	D	202·5	2,855·7	4,142·6
Welkom (*b*)	S	120·0	120·0	109·6	**Anglo Transvaal**				
West Reefs Ex. (*b*)	D	105·0	1,004·2	3,237·6	Hartebeestf'tein(*d*)	J	433·0	1,724·0	1,970·0
Central Mining					Loraine (*d*)	S	69·5	69·5	70·0
Blyvoor (*b*)	J	156·0	636·0	1,292·0	Virginia O.F.S. (*d*)	J	280·7	1,094·3	1,377·3
Harmony (*b*)	J	371·4	1,541·4	2,027·6					

Table includes profit from uranium, acid and pyrite, before loan redemption. (*a*) Including profit from gold section. (*b*) Including royalty provision. (*c*) Total profit from uranium section. (*d*) Excluding royalty provision. *Net revenue. † Uranium royalty received. ‡Pyrite.

Chairman's Statement : RHODESIAN ANGLO AMERICAN LIMITED

Incorporated in Northern Rhodesia

Political Issues have Tended to Obscure Steady Economic Progress in the Federation

Encouraging Developments in Industrial and Social Relations

Mr. H. F. Oppenheimer Stresses Need to Accelerate Development of Country's Resources

The following is from the statement by the Chairman, **Mr. H. F. Oppenheimer,** which has been circulated with the annual report and accounts:—

During our financial year the majority of copper producers in the western world decided to impose cuts in production or sales to restore the balance between copper supplies and demand. These measures helped to arrest the downward trend in price, which had reached a low point of £218 per ton in October, 1960, and since then the price has remained relatively stable. The three copper-producing companies of the Anglo American Corporation Group, Rhokana Corporation, Nchanga Consolidated Copper Mines and Bancroft Mines, from which the major part of our income is derived, decided in October last year to withhold 10 per cent of their production from the market.

The profits of all three companies were affected by the lower copper price and the cut in sales, but Bancroft suffered proportionately more owing to its higher cost of production. Rhokana and Nchanga were able to maintain their dividends, but Bancroft has recommended a reduction from 1s. to 9d. net per stock unit for the year, in view of the lower profits and the programme of capital expansion. In the result our net profit for the year of £7,251,275 was slightly higher than in 1960.

After recommending a final dividend of 6s. net, which with the interim dividend of 2s. gives the same distribution as last year, we have been able to transfer £1,876,571 to general reserve. After the transfer from this year's profit and from investment reserve the general reserve now stands at £9,250,000.

Outlook for the Federation

Our Company's prospects depend so much on the future of the Federation that members may like to have some assessment of the political and general situation. Seen from outside, the Federation may appear during the last year to have undergone a series of political crises, to have had a stagnating economy, and to have made little progress along its avowed path of partnership. Certainly if stock exchange prices are a fair indication of Britain's and the Continent's view of the future of the country, they show little confidence, with Federal Government stock yielding around 9 per cent and copper mines with large ore reserves standing on a yield basis of about 16 per cent net after Federal taxes.

Nevertheless in my opinion it has been a year of great and heartening progress politically, economically and socially. Outstanding in the political field was the Referendum in Southern Rhodesia where by a two to one majority the electorate—at present largely European—voted for a new and progressive constitution. There has been a tendency to regard this constitution simply as one which, by the introduction of a separate lower roll, will give Africans 15 seats in an enlarged Assembly of 65 members. That may well be one immediate result; but in addition to the provision in this way of African representation in the Assembly, and an immediate increase in the total number of African voters, the non-racial character of the franchise will soon lead, with normal educational and economic progress, to significant African numbers on the upper roll as well. To my mind it is wrong to consider these changes necessarily in terms of racial conflict, as most of the existing political parties have members of all races and this tendency is increasing.

The party in power in Southern Rhodesia took the situation further forward at its Congress last month by voting without opposition that the Government should press ahead with legislation to allow the acquisition of land anywhere in Southern Rhodesia without regard to race (except that the Reserve land should continue to be protected for the benefit of its African inhabitants), and to facilitate the absorption of urban Africans into a non-racial community. At the same time it voted to introduce legislation after the next election to ban racial discrimination in public places; in fact many hotels and cinemas in Southern Rhodesia are already non-racial. In Northern Rhodesia, where the major interests of our company are established, similar legislation was introduced in September, 1960, and, after a few minor incidents, the new order has worked well.

However, the indecision over the constitutional plans for Northern Rhodesia led to some loss of confidence within the Territory and to a series of acts of arson and sabotage mainly in the Northern Province. The purpose of this lawlessness appears to have been to persuade the British Government to revise the constitution it announced in June. Whether or not these proposals are revised, it is certain that the influence of African voters will grow very rapidly, and this is a concept which is becoming increasingly accepted in Northern Rhodesia. The situation as I write is now calm; and in fact at the time it was clear that the incidents caused anxiety and resentment among large numbers of the African population.

The future constitutional shape of the Federation is still undecided and no date has yet been set for the Federal review talks. The Malawi Party now in power in Nyasaland has continued to voice its opposition to the Federation, but I remain convinced that Federation provides greater prospects for economic advance and for stability than the three territories could achieve individually; and certainly the facts of economic progress since federation are impressive.

While I do not regard economic progress as a substitute for political advance, equally I believe that immediate universal suffrage in these territories carries the risk of a sharp decline in living standards, and that the considerable number of Africans who favour qualifications for the suffrage can in no sense be called stooges because they support responsible Government. Very shortly after the start of Federation I said that its chief problem was poverty and, although since then there has been a great improvement in living standards, poverty and unemployment are still the major problems.

While there have been great advances in industrial activity, a firm foundation for an expanding economy in the Federation can only be assured by extensive rural development, leading to a general increase in cash earnings above the subsistence level by the majority of the people in the rural areas where 80 per cent of the population live. Rural development, in my view, is not only the best immediate means of widening employment and providing better living standards for the lowest capital cost, but should in turn lead to increased industrial activity. All three territories are working on schemes for land settlement and greater productivity, and our Group has indicated to the Federal Government our readiness to make loans available to assist this type of development.

The concentration of attention on political issues has tended to obscure the steady progress made by all sections of the economy apart from the building industry. The level of industrial activity in all manufacturing groups was 9.8 per cent greater in 1960 than in 1959 and there is every indication that this year will again show substantial progress.

In the sphere of mining there has been

further expansion. In Southern Rhodesia the value of mineral production was £26,380,000 in 1960 compared with £25,003,000 in 1959. In Northern Rhodesia, our Group is engaged on three major schemes involving an aggregate estimated capital cost of £15,000,000.

Similarly, the Rhodesian Selection Trust Group's Mufulira Mine, in which we have a substantial interest, has been engaged on a major expansion scheme involving the development of the Mufulira West Orebody.

Industrial and Social Developments

On the Copperbelt, and at Broken Hill and Wankie, the year has seen considerable progress in industrial and social relations. Last year I referred to the preliminary agreement the copper mining companies had reached with the European-controlled Northern Rhodesia Mine Workers' Union to establish a unified wage scale with no racial bar to progress. Although in our subsequent negotiations with the Northern Rhodesia African Mineworkers' Trade Union on the implementation of these proposals we are meeting many difficulties, I am hopeful that in due course we shall reach agreement. Meanwhile Africans and Europeans are being trained side by side in the underground schools at Nkana and Nchanga to qualify for jobs previously attainable only by Europeans. We are also negotiating with the Mines African Staff Association for the advancement of Africans in the staff field. All our African employees on the copper mines have this year been brought into the Group pension scheme which will give them greatly enhanced security and benefits. At Wankie, as a result of new industrial agreements in Southern Rhodesia, it is intended that European and African mineworkers will for the first time be represented by a single trade union as has already happened with officials and salaried staff of all races. The mines now have football, athletics and other sports sides in which the races participate together and I would particularly like to mention the outstanding success of the Wankie football team, which reached the final of the Southern Rhodesia Amateur Cup.

The first children to benefit from the creation of the Northern Rhodesia Educational Trust by the Copperbelt mining companies were admitted to schools in 1960. About 2,400 children have so far started their primary education in new schools or classrooms built with Trust money and this year five Trust secondary schools have been opened. Plans are in hand for the construction of a new college at Mufulira to provide additional teachers.

The College of Social Service at Lusaka, named after my father, is to receive its first intake of 33 students in January next year. The enrolment includes African, European and Coloured students, both women and men, drawn from different territories in Southern and East Africa. The Outward Bound School in the Chimanimani Mountains has run three very successful courses on non-racial lines as part of a pilot project, and the permanent school is to be started next year to take about 250 boys a year from all over the Federation. With the facilities shortly to be available at such institutions as the Bernard Mizeki School, St. Ignatius College and the Nyatsime College, substantial numbers of Africans will now be able to provide their children with a public school education.

Breaking down of Social Barriers

All these projects have called for considerable contributions from both firms and individuals, and it is most impressive how much time, energy and money some citizens of the Federation are ready to devote to these causes. There has also been a most encouraging increase in the provision of services, training and amenities on a non-racial basis by voluntary organisations.

While I do not for a moment suggest that there are not still grave political, social and economic problems, credit should be given to the substantial advance that has been made. It is, I think, generally realised now that in the spectacular economic progress of the first three or four years of Federation attention was diverted from urgent social and political problems, but an outstanding effort is being made to make up for the time and opportunities that were lost.

I continue to believe that the Federation, given proper encouragement, constructive criticism and time, has a great chance of creating a genuinely non-racial society with a prosperous economy. To this end it is vital that immediate action should be taken to accelerate the development of the country's resources and so to provide better living standards for the mass of the population. It is my hope that our Group will continue to contribute to this advance.

Copies of the annual report and accounts are obtainable from the London office of the company, 40, Holborn Viaduct, E.C.1.

RHOKANA CORPORATION LIMITED

(Incorporated in Northern Rhodesia)

ADVERSE EFFECT OF LOWER COPPER PRICES

UPWARD TREND IN WORLD CONSUMPTION CONTINUED

The following is an extract from the review by **Mr. H. F. Oppenheimer,** the chairman, which has been circulated with the annual report and accounts:—

The lower copper prices prevailing during the year and the voluntarily reduced sales resulted in our gross profit from mining operations of £8.3 million being £1.9 million less than in the previous year. The adverse effects of the world market were partially offset in our case by a reduction in the unit costs of mining and treating copper. On the other hand, the cost of production of cobalt rose sharply and operations resulted in a small loss.

Our investment income of £4.87 million was £0.65 million higher than last year, mainly owing to the receipt of the Bancroft Mines maiden ordinary dividend, and our total gross profit was £14.37 million. Taxation has to be provided at the increased rate of 8s. in the £ now applicable to public companies in the Federation, and our net profit was £10.95 million compared with £11.53 million last year.

The increased tax rate has also necessitated the provision of £0.26 million in respect of additional tax on last year's profits. The directors have appropriated £1.5 million for capital expenditure, placed £0.25 million to general reserve and have recommended the maintenance of the final dividend at 5s. 6d. (net), which together with the interim dividend of 1s. 6d. makes an unchanged 7s. (net) for the year.

Copper Market

At the beginning of our financial year in July, 1960, the cash price of copper on the London Metal Exchange was £254 per ton, rising to £260 later in the month. From August prices steadily receded until, in October, a low point of £218 per ton was reached.

Early in October, 1960, the two producing groups in Northern Rhodesia and certain major producers in North America and in the Congo decided to impose voluntary cuts in production or in sales with a view to correcting the imbalance between supply and demand. In the first quarter of 1961 similar action was taken by other major producers in South and North America and, at that time, it was estimated that the flow of copper to world markets would be reduced by some 250,000 tons per annum. Two of the North American producers have since returned to normal production and the effective reduction in copper supplies is now probably of the order of 180,000 tons annually.

Largely as a result of these measures the downward trend in prices was arrested and at the end of December the market closed at £228 per ton. During the first nine months of 1961 prices on the London Metal Exchange remained relatively steady with a low point in January of £216 per ton and a high point of £248 per ton in May.

The past 12 months have not been free of strikes among the world's major producers. Apart from short shutdowns at various properties, there was a six weeks' strike in October, 1960, at Chuquicamata which resulted in an estimated loss of output of some 35,000 tons. During August and September, 1961, further strikes in Chile and in North America caused losses in copper production amounting to upwards of 60,000 tons. Despite this loss of copper on world markets and political uncertainty in parts of Africa there has not been any hardening in prices. The long term prospects nevertheless remain encouraging. The era of major expansion in the world's productive capacity appears to have come to an end and the upward trend in consumption promises to continue.

The increase in the cost of cobalt production to which I have referred was due mainly to difficulties in recovery and to a reduction in the overall grade.

The political developments in Katanga and the unrest in the Northern Province of Northern Rhodesia did not affect production at Rhokana, which continued uninterrupted throughout the year.

Sabotage in Northern Province

There has recently been a spate of attempts at sabotage of communications and public buildings apparently arising from the dislike expressed by some African nationalists of the amended constitutional proposals for Northern Rhodesia. The main campaign of sabotage and arson has, however, been centred in the Northern Province, hun-

dreds of miles from the Copperbelt. I am glad to say that the incidence of violence has been contained by firm Government action. There is not much hope of any constitution working until widespread intimidation and violence are eliminated and I trust that those who are in a position to bring the unrest to an end will come to realise that no good will be achieved for the country or themselves by pursuing their political objectives by such means.

The influence of political unrest and uncertainty in Northern Rhodesia and in the Congo over the past year has inevitably been felt by our employees, European and African alike, but they have nevertheless continued to provide the same high standard of service and loyalty as in the past.

Copies of the annual report and accounts are obtainable from the London Office of the Corporation, 40, Holborn Viaduct, E.C.1.

HARMONY GOLD MINING COMPANY LIMITED

(Incorporated in the Republic of South Africa)

The eleventh Ordinary General Meeting of shareholders will be held in Johannesburg on November 20, 1961.

The following is an extract from the circulated review of the affairs of the Company by the Chairman, **Mr. P. H. Anderson,** dated November 10, 1961.

Operations at the Mine

Negotiations for the sale of approximately 397 claims were started during the year. Although the provisional agreement of sale was not ratified until July, it was essential in the interests of shareholders to increase the development rate in order to prepare for the replacement of actual and potential working faces that were included in the areas that were the subject of the provisional deed of sale. Whether a milling rate of 200,000 tons per month can be maintained or not depends very largely on the supply of labour and on what the present exploratory development programme reveals. In order to maintain the current milling rate, ore will have to be drawn from the area to the south and west of No. 3 Shaft and a development programme to open up and explore this ground has been initiated.

The development and sampling results given for the year ended June 30, 1961, include development and sampling in the northern area of approximately 313 claims sold to the Virginia Company (known as area "A"), but do not include work done by the Virginia Mine in the southern area of approximately 84 claims (known as area "B"). As the sale was ratified in July, 1961, all results of operations given after July 1, 1961, exclude work done on behalf of the Virginia Mine.

Gravity concentration of gold in the reduction plant was finally discontinued during July, 1961, and the plant now operates on full cyanidation only. The plant is capable of milling slightly in excess of its rated capacity of 200,000 tons per month.

Sale of approximately 397 claims to Virginia Orange Free State Gold Mining Company Limited

The minimum purchase price of R6,000,000 is payable quarterly, and the first instalment of R225,000 was received at the end of September, 1961. Stoping by this Company of 10,000 fathoms in Area "A" as provided in the agreement was completed during August this year, and full possession and occupation of both Areas "A" and "B" has now been taken by the Virginia Company.

Uranium

The Company produced a total of 487.2 tons of uranium during the year ended June 30, 1961, leaving a balance of 2,806 tons to be supplied from July 1, 1961, until the end of 1970. With the increase in the milling rate it is now necessary to dump uranium-bearing slime that is in excess of the capacity of the uranium plant. At June 30, 1961, the approximate quantity of accumulated slime was 46,000 tons.

Finance

The amount spent on capital account, after allowing for certain credits, amounted to R3,140,249 during the financial year under review. In the Annual Report it was stated that capital expenditure for the three year period from July, 1961, to June, 1964, was estimated at R4,000,000 of which approximately R2,000,000 was expected to be spent during the year ending June 30, 1962. Both the figures may be exceeded slightly, depending on the area of additional land purchased for water disposal purposes.

In addition to the Reduction of Share Premium No. 1 of 3 cents per share, Dividend No. 11 of 14 cents per share was declared on September 15, 1961.

Taxation

At June 30, 1961, the Company had an estimated income tax loss of R3,269,000 and an estimated loss for lease purposes of R3,753,000, and no South African taxation or lease consideration was payable during the year under review. At September 30, 1961, it was estimated that the tax loss had practically been extinguished and it is evident that taxation should be payable during the current financial year. For the purpose of making a rough calculation, the combined tax and lease payments that the Company will make to the State, in terms of existing legislation, will be approximately 71 per cent of any profit (less capital expenditure) that is in excess of 6 per cent of revenue.

International Harvester have selected four items of equipment for display on their stand at this year's Building Exhibition. Two of these, an industrial front end loader and backhoe combination on a B-275 industrial tractor, and a mobile self-contained electric power plant powered by and carried on a B-275, are recent additions to the International range. Illustration shows the industrial front end loader and backhoe combination on B-275 industrial tractor

Burmah Oil.—An interim dividend of 6d. per share, free of tax, has been declared. This is the same as last year when a final dividend of 1s. 4½d. was paid.

Lake View and Star.—With the recommended final dividend of 1s. 6d. per share the total dividend for the year is maintained at 2s. 6d.

New Canadian Zinc Refinery.—A new $20,000,000 zinc refinery, geared mainly to the export market is to be built near Valleyfield, Quebec. Mattagami Lake mines, together with four other ocmpanies, are to provide the capital for this project. The plant is scheduled to be complete by December 1963.

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The Annual Progress Report of the Geological Survey Branch of the Mines Department for the year 1958 has now been published by the Department of Mines in Western Australia. Among its reports is an account of the search for oil in Western Australia in 1958, and a report on a gold find on Wildara Station, East Murchison Goldfield. The Geological Survey has also published its Bulletin No. 114, Miscellaneous Reports for 1957, which contains 45 plans in separate atlas.

BLYVOORUITZICHT GOLD MINING COMPANY LIMITED

(Incorporated in the Republic of South Africa)

The twenty-fourth Ordinary General Meeting of shareholders will be held in Johannesburg on November 21, 1961.

The following is an extract from the circulated review of the affairs of the Company by the Chairman, **Mr. T. Reekie,** dated November 2, 1961.

Working Results

The results achieved during the year under review established many new records for the Company. A new record profit from gold production of R15,965,384 was attained and the profit from the production of uranium oxide and sulphuric acid, at R3,779,000, was also the highest recorded by the Company.

Development and Ore Reserve

The footage developed underground also exceeded previous rates. Due, however, to the need to provide connections between the new "B" series of sub-incline shafts and the recently completed "A" series and to advance the three cross-cuts from the vicinity of A2 Sub-Incline Shaft to connect with the new No. 4 Vertical Shaft which is being sunk from the surface, the additional development footage was all off-reef. In the lower grade western section of the mine, however, development continues to be of an exploratory nature on the reef horizon. About 35 per cent of the footage developed on reef was in this lower-than-average-payability area, but nevertheless the general payability of reef disclosures fell off slightly in association with a small reduction in the channel width of the reef. It is not possible at this stage to determine whether or not this represents any persistent trend. It is of interest to note the establishment of some new ore reserve blocks in the section towards the western boundary of the property.

No. 4 Vertical Shaft

Sinking progress during the year under review was satisfactory and, at the year end, the shaft had reached a depth of 2,472 feet below the surface. Since July, however, the intersection of a series of water-bearing fissures has necessitated further cementation and caused some delay. It is clear that considerably more serious delays and difficulties would have been encountered in this badly fissured zone had pre-cementation of the shaft area not been undertaken in the first instance. Sinking operations were recommenced early in October.

The three haulage cross-cuts which are to link No. 4 Shaft with the rest of the mine, two on the 6th level and the third on the 8th level, were advanced steadily during the year.

Accounts

The working profit for the year from gold, uranium and sulphuric acid of R19,744,384 was increased by sundry net income to a total profit of R19,987,231. Appropriations made for taxation, mineral lease consideration, dividends, repayments of the capital portions of the uranium and acid plant loans, and current net expenditure on mining assets, exceeded the total profit by R564,590, which amount was accordingly charged against the balance of the Income and Expenditure Account, thereby reducing it to R5,531,851 at June 30, 1961. Revenue Reserves, including the unappropriated balance, plus the small unexpended balance of the uranium and acid loans, were represented by net current assets totalling R5,974,154. Of the total loans obtained to construct the uranium and acid plants, R2,982,510 remained at June 30, 1961, to be repaid in equal quarterly instalments over the ensuing 2½ years.

Of the R2,829,591 spent on Capital Account during the year, approximately two-thirds was spent on the new No. 4 Vertical Shaft and its ancillary requirements, the remainder being mainly spent on the preparatory work and winders for sinking the "B" sub-inclines, pumping equipment. Of the R4,600,000 which it is estimated will be spent during the current year, No. 4 Shaft will again absorb about two-thirds, while the "B" sub-inclines will require approximately R900,000.

In relation to the total profit for the year of R19,987,231, the provision for taxation and mineral lease consideration represented 51.9 per cent. The two dividends declared were each of 13 cents per share, and equalled 31.2 per cent of the total profit.

Uranium

The Board considered it to be in the Company's interest, provided it could be done without financial loss, to keep the uranium and sulphuric acid plants in production for as long as possible in order to be in a better position for taking advantage of any revival in the demand for uranium. Under the revised arrangements the Company's plants will be in operation until the end of 1966, and over the increased period there is expected to be a financial gain compared with what the Company would have received under the previous contract which was due to expire in December, 1963.

CONSOLIDATED MAIN REEF MINES AND ESTATE LIMITED

(Incorporated in the Republic of South Africa)

The sixty-third Ordinary General Meeting of shareholders will be held in Johannesburg on November 21, 1961.

The following is an extract from the circulated review of the affairs of the Company by the Chairman, **Mr. T. Reekie,** dated November 2, 1961.

Working Results

Mining operations during the year under review again contracted considerably, and at 591,000 tons, only a little over half the previous year's figure was milled. There was an improvement in the grade of the ore mined, occasioned by the continued policy of selective mining and by the working of certain shaft pillars which have a higher than average value, and the revenue was enhanced by a slightly higher price of gold. Nevertheless, the profit per ton milled was less than in the previous year, due to a rise in unit working costs which, despite substantial reductions effected in European and Non-European labour and in the consumption of stores, materials and electric power, was brought about by the very much lower milling rate. The working profit for the year at R75,359 was less than half that achieved in the previous year, but an additional 2,500 ounces fine were recovered from clean-up operations, to give a total working profit for the year of R138,109.

Development and Ore Reserve

The total ore reserve, including shaft and safety pillars, was re-estimated at June 30, 1961, to be 227,000 tons of a value of 6.7 dwt. over a stoping width of 39.2 inches. The lack of replacement tonnage from development, the steady drawings from existing reserves for current milling, and the exclusion of additional tonnages of marginal ore as the pay limit continues to rise, are factors which have combined to reduce the ore reserves.

Position at the Mine

Mining operations are now confined to the Main Reef Leader and the South Reef. The extraction of the shaft pillars of No. 4 Vertical Shaft, No. 3A Incline Shaft, and, at a later date, No. 3 Vertical Shaft, together with reclamation in and the sweeping of old areas mainly in the shallower sections of the mine, will constitute the future sources of underground tonnage. Although the rate of production of ore from underground is likely to drop still further, efforts are being made to maintain the present milling rate for a somewhat longer period than originally expected by obtaining an increased tonnage from surface accumulations which can be treated profitably. In the latter connection it has been decided, after extensive sampling, to install the necessary plant to return for treatment accumulated slime from a vlei to the north of the reduction works.

Shareholders will appreciate that the value of such of the assets as may be realisable, especially items such as land, machinery, plant and buildings, is entirely dependent upon the market that may exist when the time comes for disposing of them. The Company's freehold property is to a certain extent encumbered by mining occupations such as dumps, slimes dams, etc. A great deal of the land is undermined at shallow depths, and it is at present subject to restrictions imposed by the Gold Law. However, the question of disposing of these assets including portions of the freehold is continually under consideration, and such surplus assets as it is possible to sell from time to time, are being disposed of.

Imperial College of Science and Technology have issued their *Calendar* 1961-62, which covers all information relating to the three institutions—Royal College of Science, Royal School of Mines and City and Guilds College.

A new data sheet describing their *Cobalt-Platinum Permanent Magnet Alloy* is now available from Johnson, Matthey & Co., which gives full information, including a new section on heat treatment process.

Company News

Hawker Siddeley Brush Turbines have been awarded a contract by Constructors John Brown Ltd., for three axial flow compressors for a large tonnage oxygen plant in Poland. The compressors will be electrically driven (6,000 h.p. approx.) and delivery of the first set is due in December 1962. The machines are the first of their type to be manufactured in the U.K., and the first to be supplied by a British company for use in a tonnage oxygen plant. Constructors John Brown are working in association with Hydrocarbon Research Inc. of America, who are supplying the process techniques for the plant.

★

H. J. H. King & Co. has been acquired by Cozens & Sutcliffe Holdings Ltd. Mr. H. V. Cozens will be chairman, in the place of Mr. Rymer, who will continue as sales and technical director. The Nailsworth business will be run as a separate unit.

★

J. D. Tractors, sole concessionaires in England and Wales for John Deere-Lanz equipment, announce the appointment of Bristol Plant Hire Ltd. as sales and service dealers, to cover Hampshire, W. Sussex and E. Dorset. Bristol Plant Hire will be operating from Fareham, near Portsmouth.

★

The Montgomerie Ried Engineering Co. announces that it has taken over R. H. Corbett & Co. of Rochester, and will now manufacture and market the complete range of trucks which that company produced. There will be no alteration in the names or prices of the trucks.

★

The French subsidiary of the Aluminium Company of Canada has changed its name from "Alcan Aluminium de France" to "Aluminium Alcan de France".

★

Self-advancing hydraulic powered supports manufactured by A. G. Wild & Co. are in use at the Donisthorpe Colliery (E. Midlands Division, Area 7) where a new national coal face productivity record has been set up. Working two shifts daily, 4,803 tons of saleable coal were produced in five days, giving a record figure of 2.9 tons per manshift.

★

British Jeffrey-Diamond announce the appointment of two new directors, Mr. J. Graham and Mr. P. C. Maccormac.

★

The North British Rubber Co. announce the appointment of Mr. C. McInnes as conveyor belting sales manager.

★

Mr. Frank Tompkins has been appointed home sales director of Nu-Swift, and associated companies, in succession to Mr. H. C. Baadsgaard, who has retired.

★

Matbro announce that Mr. T. Darling has been appointed sales director of the company.

★

The British Iron and Steel Federation announces the following appointments: Mr. E. W. Senior, director of the Federation, and Mr. J. B. Cowper, managing director of British Iron and Steel Corporation, in addition to his present post of financial director of the Federation.

ATLAS COPCO STEP UP ROCKDRILL AND SPARES OUTPUT

Two New Workshops in Stockholm

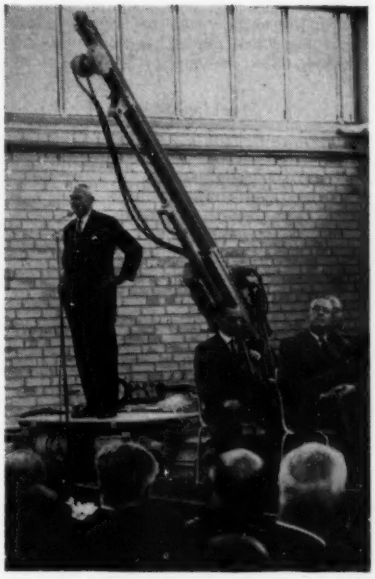
OUTPUT from Atlas Copco AB Stockholm, will be almost doubled when two newly opened workshops at Sickla, just outside the city, come into full production. Entitled Simba and Sirocco, the two workshops will produce drill rigs, wagon drills and compressor units on the one hand, and rock drills and spares on the other.

The rock drill workshop (Sirocco) is highly automated. It has a floor area of 52,000 sq. ft., and when in full production will employ 180 men who will be principally engaged in machining, grinding and heat treatment. Previous times for machining have been cut by half. This workshop has a central plant for swarf disposal and coolant recovery, and has been designed with a view to expansion without the need for any appreciable increase in the number of operators.

The Simba workshop covers 40,000 sq. ft., employs 150 men and contains panel beating and welding sections, a machining department and general assembly lines.

Inauguration Day

On the recent inauguration day for the two workshops, an exhibition was staged to illustrate the theme "A hundred years of rock drilling". Of special interest was a compressed air-driven rock drill used in driving the Mont Cenis tunnel in the 1860's. This drill was invented by Germain Sommeiller and made by the Cockerill company in Belgium. This old drill was lubricated by five boys.



The chairman of the company, Dr. Marcus Wallenberg, during the inauguration speech.

The workshops were officially declared open by Dr. Marcus Wallenberg, chairman of the Atlas Copco board. The guests were welcomed by Mr. Allan Belfrage, managing director of Atlas Copco AB.

CITY OF LEICESTER
CITY SURVEYOR'S DEPARTMENT

Applications are invited for the following appointments in my Department:—

Technical Assistants (Engineering Branch). Salary up to Grade A.P.T.II (maximum £960 p.a.) according to qualifications and experience.

A knowledge of building construction will be an advantage and consideration will be given to Mining Surveyors.

The Local Government Superannuation Acts apply.

Applications, stating age, qualifications and experience, together with the names of two referees, should be forwarded to me by November 27, 1961.

John L. Beckett, M.I.C.E.,
City Surveyor.
Town Hall,
Leicester.

IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY

Rio Tinto Educational Trust Awards tenable at the Royal School of Mines in October 1962.

Rio Tinto Research Bursary—£550-£850 p.a. (according to qualifications and experience), out of which fees must be paid, normally for two years for research connected with mineral exploration, mining, mineral technology of extraction metallurgy. Candidates must hold an appropriate honours degree.

Rio Tinto Advanced Course Bursaries—£475-£675 (according to qualifications and experience), out of which fees must be paid, for a post graduate diploma course of one session in Applied Geophysics, Mineral Exploration, or Mining. Candidates must hold an appropriate first degree.

Further particulars, and application forms (to be returned by March 31, 1962) obtainable from the Registrar, Imperial College, South Kensington, S.W.7.